NOAA NESDIS CENTRAL SATELLITE DATA PROCESSING CENTER



Advanced Very High Resolution Radiometer (AVHRR) Level 1b Format Specification for NOAA-N and the IJPS Era

Version 1.1

September 27, 2004



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Table of Contents

1	In	troductiontroduction	1
2	Aŗ	pplicable Documents	1
3	Da	ata Representation and Storage	1
	3.1	Bit Numbering	<i>2</i>
	3.2	Signed Integers	<i>2</i>
	3.3	Unsigned Integers	2
	3.4	Scaled Integers	<i>3</i>
	3.5	Byte Ordering	<i>3</i>
4	A	VHRR Level 1b Format Specifications	4
	4.1	AVHRR 1b Primary Header Record Format	5
	4.2	AVHRR 1b Data Record Format (Full Resolution)	
	4.3	AVHRR 1b Data Record Format (Reduced Resolution)	21
5	TI	BCs/TBDs	29
6	No	otes	29
7	Ac	cronyms	30

1 Introduction

This document describes the AVHRR Level 1b format, which is being updated for the IJPS era, beginning with NOAA-N. This updated format will be applicable for all AVHRR Level 1b data sets from the NOAA-KLMNN' and Metop satellites beginning at or around the launch of NOAA-N.

Level 1b format specifications for the primary header record and the data record of all types of AVHRR data (see below) are provided in this document. Please note that as part of the updates to the Level 1b formats for NOAA-N and the IJPS era is the inclusion of additional, or secondary, header records. They will contain ancillary data set names and any metadata needed for, primarily, reprocessing. Currently, the content and format of any secondary header record is TBD. Applications that will access AVHRR Level 1b data sets should use the "Count of Header Records in this Data Set" field, located in the first, or primary, header record, to calculate the position of the first data record and skip the secondary header records.

The type of AVHRR data received from the spacecraft and/or output into Level 1b data sets by the preprocessing software falls into two main categories: (1) full resolution and (2) reduced resolution. The full resolution (i.e., 1 km) AVHRR data includes LAC (from NOAA satellites only), HRPT (from both NOAA and Metop satellites), and FRAC (Metop only). (FRAC is the full resolution orbital AVHRR data from Metop.) The reduced resolution (i.e., 4 km) AVHRR data includes GAC (NOAA only) and reduced resolution (i.e., "GACized") FRAC (Metop only). The latter is FRAC data that has been sub-sampled by the preprocessing software to yield a GAC-like 1b output for those products and applications that can only handle GAC resolution data.

2 Applicable Documents

Table 1 presents a list of applicable documents (AD-#).

Doc#	Title	Reference Number	Issue	Date
AD-1	Unique Instrument Interface	IS 20029950	J	June 18, 2001
	Specification for the			
1	AVHRR/3			
AD-2	AVHRR/3 Instrument	MO-IC-MMT-AH-0001	4, rev.	January 2001
	Interface Control Document		0	
AD-3	NOAA KLM User's Guide			Sept. 2000

Table 1 - Applicable Documents

3 Data Representation and Storage

This section describes the bit and byte numbering conventions used in this document, and the storage methods for integers and floating point numbers. This information is especially critical when transporting data from one computer architecture to another. Without special handling, data produced on one system may be unusable on another due to differences in internal data storage.

3.1 Bit Numbering

A byte in this document is defined as containing 8 bits. A word is 8, 16, or 32 bits in length. In all cases, the least significant bit (lsb) is designated as bit 0 and has a base-10 value of $2^0 = 1$. Therefore, in an 8-bit word the most significant bit (msb) is designated as bit 7, and has a base-10 value of $2^7 = 128$. In a 16-bit word the msb is designated as bit 15, and has a base-10 value of $2^{15} = 32,768$. In a 32-bit word the msb is designated as bit 31, and has a base-10 value of $2^{15} = 32,768$.

3.2 Signed Integers

For signed binary integers, the msb represents the sign of the number. The remaining bits (bits 6 through 0 for 8-bit words, 14 through 0 for 16-bit words, and 30 through 0 for 32-bit words) are used to designate the magnitude of the number. Therefore, the range of signed binary integers is based on word size as follows:

- 1 byte -128 to 127
- 2 bytes -32,768 to 32,767
- 4 bytes -2,147,483,648 to 2,147,483,647

Positive binary integers are in true binary notation with the sign bit set to zero. Negative binary integers are in two's-complement notation with the sign bit set to one. Negative binary integers are formed in two's-complement notation by inverting each bit of the positive binary integer and adding one.

3.3 Unsigned Integers

Unsigned binary integers use all bits including the msb to represent the magnitude of the number. Therefore, their range is as follows, again, based on word size:

- 1 byte 0 to 255
- 2 bytes 0 to 65,535
- 4 bytes 0 to 4,294,967,295

A field containing a binary integer is given the data type of unsigned integer if its content will never be negative or if a negative value just does not make sense for that field. For example, the idea of a negative scan line number or negative date or time is nonsensical. Therefore, fields containing scan line numbers, dates, and times are labeled as unsigned integers.

Unfortunately, this data type is not supported by all computer languages (e.g., Fortran), so additional data manipulation may be necessary. In the case of reading a 16-bit unsigned integer (DATA), a Fortran user could use the following code snippet to extract the actual value (VALUE):

```
INTEGER*2 DATA
INTEGER*4 VALUE
...
READ DATA
IF (DATA .LT. 0) THEN
```

```
VALUE = 65536 + DATA
ELSE
VALUE = DATA
ENDIF
...
```

But note that nearly all unsigned integer fields can be safely read into signed integer data types of the same word sizes. This is because they were originally written to the 1b using signed integer data types, and thus will be within the positive range of the corresponding signed integer data type (see Section 3.2). The 1b format specifications will clearly indicate, by providing ranges, those unsigned integer fields that must be strictly treated as unsigned integer data typesusing the data manipulation described above, if necessary—to ensure that correct values are retrieved.

However, not all fields of an unsigned integer data type contain unsigned binary integers. Fields containing packed data are also identified as unsigned integers. While its msb is not a sign bit, a field containing packed data does not represent an unsigned binary integer. Such a field requires the user to perform some type of special unpacking technique in order to extract the information of interest from the field in order for it to be interpreted correctly. Packed data may be bit fields, packed integers, or both. A bit field is one or more consecutive bits used to indicate one of two or more possible conditions or states. (A bit flag is a specialized instance of a bit field. It is a single bit indicating one of only two possible conditions.) For example, a three-bit field may indicate which of seven different modes that an instrument is operating in (i.e., 0 implies "power on mode", 1 implies "warm up mode", 2 implies "standby mode", etc.). A packed integer is simply a binary number that is stored in just a subset of an unsigned integer field's bits.

Although similar to a bit field, a packed integer is not an indicator of a condition, but an actual numeric value having magnitude that, once unpacked, could be used in arithmetic computations.

3.4 Scaled Integers

To provide maximum portability of the Level 1b data sets across different computer platforms, floating point data is represented by scaled integers. Scaled integers can be either signed or unsigned, and are simply floating point numbers multiplied by a fixed scaling factor so that a sufficiently precise representation of the original number can be stored in integer form. For example, the floating point value 1.2313 might be multiplied by 10^2 to achieve an integer value of 123. To achieve better precision, the floating point value might be multiplied by 10^3 or 10^4 to achieve an integer value of 1231 or 12313, respectively. In the Level 1b data sets, the scaling factors are powers of ten, and only the exponents (2, 3, and 4 in the previous examples) are documented within the data set. To recover an approximation of the original floating point value, divide the integer value by ten raised to the given exponent.

3.5 Byte Ordering

A major problem impeding the free transport of binary data from one computer system to another is the "Big Endian - Little Endian" dichotomy. *Big Endian* systems (e.g. IBM 370, Macintosh, SGI, Sun SPARC) store bytes of binary numeric data in reverse order relative to *Little Endian* systems (e.g. IBM PC, DEC Alpha). For example, a 32-bit hexadecimal value of x01020304 (decimal value 16,909,060) written to a binary file by a Big Endian system would be

read from the file as x04030201 (decimal value 67,305,985) by a Little Endian system. Level 1b data sets generated and archived by NOAA are in Big Endian order; users with Little Endian systems must include an additional byte-swapping step when reading binary numeric data from Level 1b data sets produced by NOAA. Some processors support byte swapping in their instruction sets, but others must use compiler-dependent functions.

4 AVHRR Level 1b Format Specifications

The format specifications for the AVHRR Level 1b header record and AVHRR Level 1b data record are given in this section. The meaning of each column in the format specifications is defined in Table 2.

Name	Description
Field Name	The name or brief description of the field.
Start Octet	Offset location of first octet in the defined field from beginning of record, starting with octet 1. (Note that the terms "octet" and "byte" are used interchangeably and mean the same thing.)
End Octet	Offset location of last octet in the defined field from beginning of record.
Data Type	Data Type (i - integer, u - unsigned integer, c - character). Character data is stored as ASCII.
Word Size	Number of octets per data word.
Number of Words	Number of words of indicated size and type contained in the defined field.
Scale Factor	Scaling Factor.
Units	The field's unit of measurement (e.g., octets, counts, Kelvin, volts), if applicable.
Notes	References to notes that follow the format specifications in Section 6.

Table 2 - Description of Format Specification Columns

4.1 AVHRR 1b Primary Header Record Format

OTE: Except for the zero-fill padding, the primary header record specification is identical no matter the type of AVHRR data.

					Number	Scale		Τ
Field Name	Octet	Octet	Type	Size	of Words	Factor	Units	Notes
FILE IDENTIFICATION	<u> </u>							
Data Set Creation Site ID	1	3	С	3	1	0	ĺ	
CMS=Centre de Meteorologie Spatiale/France	1			l .				
DSS=Dundee Satellite Receiving Station/UK NSS=National Environmental Satellite, Data and Information					'			
Service/USA		ļ						
UKM=United Kingdom Meteorological Office/UK					_			
<ascii blank="x20"></ascii>	4	4	С	1	1	C		
Level 1b Format Version Number	5	6	u	2	1	C		
Level 1b Format Version Year (four digits, e.g., 2000)	7	8	u	2	1	C		
Level 1b Format Version Day of Year (e.g., 365)	9	10	u	2	1	0		
Reserved for Logical Record Length> (For Creation Site use	11	12	u	2	1	C	octets	
only. Logical Record Length of source 1b data set prior to								
processing.)						ļ		
Reserved for Block Size> (For Creation Site use only. Block	13	14	u	2	1	0	octets	1
Size of source 1b data set prior to processing.)		-			1			
Count of Header Records in this Data Set	15	16	u	2	1	(
<zero fill=""></zero>	17			2				1
Data Set Name	23			42				
Processing Block Identification	65			8				-
Spacecraft Identification Code	73			7	1			
NOAA-L	'~] '	"	-	1	`		Ì
7=NOAA-K						1		
6=NOAA-M	1				İ			1
7=NOAA-N								
8=NOAA-N' 11=Metop-1 (TBC)				ļ				
11=Metop-1 (TBC)	1	ŀ	1	i				
Instrument ID	75	76	u	2	1			
301=s/n A301 (NOAA-L)			ŀ					
302=s/n A302 (NOAA-K)								1
303=s/n A303 (NOAA-N')								
304=s/n A304 (NOAA-M)								
305=s/n A305 (Metop-2) 306=s/n A306 (NOAA-N)							!	
307=s/n A307 (Metop-1)]	ı				1_
Data Type Code	77	78	u	2	1	()	
1=LAC (NOAA only)	ĺ	1						
2=GAC (NOAA GAC or "GACized" FRAC)		1	i	}				1
3=HRPT (NOAA or Metop)								
13=FRAC (Metop only) TIP Source Code (NOAA: values defined below) or	79	80	u		1			
	'	ا ٥٠	1 "	1	1 '	1 `	1	
<pre><zero fill=""> (Metop) 0=unused, i.e., GAC/HRPT/LAC data</zero></pre>								
1=GAC-embedded AMSU and TIP		İ		ľ				
2=stored TIP (STIP)								
3=HRPT/LAC-embedded AMSU and TIP		1		1				
4=stored AIP (SAIP)		0.	-	 	 	 	 -	
Start of Data Set Day Count starting from 0 at 00h, 1 Jan 1950	81			4		(1	
Start of Data Set Year (four digits, e.g., 2000)	85				1			-
Start of Data Set Day of Year (e.g., 365)	87			 	1			
tart of Data Set UTC Time of Day	89			4		-	milliseconds	↓ —
End of Data Set Day Count starting from 0 at 00h, 1 Jan 1950	93	1		4				
End of Data Set Year (four digits, e.g., 2000)	97	98	3 u	2	2 1		<u>'</u>	

	Stort	End	Data	Word	Number	Scale	T	
Field Name					of Words		Units	Notes
End of Data Set Day of Year (e.g., 365)	99			2	1	0	- Cints	riotes
End of Data Set UTC Time of Day	101	104		4	1	0	milliseconds	
Year of Last CPIDS Update (four digits, e.g., 2000)	105			2	1	0		
Day of Year of Last CPIDS Update (e.g., 365)	107			2	1	0		
<zero fill=""></zero>	109			2	4	0		
DATA SET QUALITY INDICATORS								
Instrument Status (These are bit flags taken from the AVHRR	117	120	u	4	1	0		
Digital B Data field on first data record for which all of the								
individual status flags have been reported at least once.)								
bits 31-16: <zero fill=""></zero>								
bit 15: scan motor/telemetry status (0=off; 1=on)		1						
bit 14: electronics/telemetry status (0=off; 1=on) bit 13: channel 1 status (0=disable; 1=enable)								
bit 12: channel 2 status (0=disable; 1=enable)	l							
bit 11: channel 3A status (0=disable; 1=enable)								
bit 10: channel 3B status (0=disable; 1=enable)	l							
bit 9: channel 4 status (0=disable; 1=enable)							1	
bit 8: channel 5 status (0=disable; 1=enable) bit 7: channel 3A/3B select status (0=3B; 1=3A)								
bit 6: voltage calibration status (0=off; 1=on)								1
bit 5: cooler heat status (0=off; 1=on)								
bit 4: scan motor mode status (0=low; 1=high)	1							
bit 3: telemetry lock status (0=not locked on; 1=locked on) bit 2: earth shield status (0=disable; 1=deploy)								
bit 1: patch control status (0=off; 1=on)								
bit 0: <zero fill=""></zero>								
<zero fill=""></zero>	121	122	i	2	1	0)	
Record Number of Status Change (if 0, none occurred; range:	123	124	u	2	1	0		
0 - 65,535)								
Second Instrument Status (if previous word is 0, no change)	125			4	1	C)	
Count of Data Records in this Data Set (range: 0 - 65,535)	129			2	1	C)	
Count of Calibrated, Earth Located Scan Lines in this Data Set	131	132	u	2	1	C	Y	1 1
(range: 0 - 65,535)								\perp
Count of Missing Scan Lines (range: 0 - 65,535)	133			2	1	C	<u> </u>	4
Count of Data Gaps in this Data Set	135			2	1	C		
Count of Data Frames Without Frame Sync Word Errors	137	138	u	2	1	C	P	
(NOAA) or	ļ						ŀ	
<zero fill=""> (Metop)</zero>								\perp
Count of PACS Detected TIP Parity Errors (NOAA) or	139	140	u	2	1	0	P	
<pre><zero fill=""> (Metop)</zero></pre>					ļ	ļ <u>.</u>		
Sum of All Auxiliary Sync Errors Detected in the Input Data	141	142	u	2	1	(7	
(NOAA) or			l					
<zero fill=""> (Metop)</zero>	142	144				ļ.,		
Time Sequence Error <i>(range: 0 - 65,535)</i> 0=none; otherwise, the record number of the first occurrence	143	144	u	2	1	C	1	
Time Sequence Error Code (These are bit flags taken from	145	146		2	1	-		+
Scan Line Quality Flags [Time Problem Code] on data record	143	140	u		1 1	۱ ۲	1	
reported in Time Sequence Error field above. If a bit is on				1	1			
(=1) then the statement is true.)								
bits 15-8: <zero fill=""></zero>								
bit 7: time field is bad but can probably be inferred from the previous								1 1
good time								
bit 6: time field is bad and can't be inferred from the previous good								
time bit 5: this record starts a sequence that is inconsistent with previous								
times (i.e., there is a time discontinuity); may be associated with a			i					
spacecraft clock update								
bit 4: start of a sequence that apparently repeats scan times that have		1						
been previously accepted bits 3-0: <zero fill=""></zero>			[
DIM 2 OF JEELO HIIIS	L	<u> </u>	<u> </u>	<u> </u>	L	L	L	

	Start	End	Data	Word	Number	Scale		
Field Name		Octet			of Words	Factor	Units	Notes
OCC Clock Update Indicator (range: 0 - 65,535)	147	148	u	2	1	o		
=none during this orbit; otherwise, the record number of the first								
occurrence	149	150	u	2	1	0		
Earth Location Error Indicator (range: 0 - 65,535) 0=none during this orbit; otherwise, the record number of the first	149	130	u		1 1	١		
occurrence								
Earth Location Error Code (These are bit flags taken from Scan	151	152	u	2	1	0		
Line Quality Flags [Earth Location Problem Code] on data	ŀ							1 1
record reported in Earth Location Error Indicator field above.				l				
If a bit is on (=1) then the statement is true.)				1				
bits 15-8: <zero fill=""></zero>	1			ŀ				
bit 7: not earth located because of bad time; earth location fields zero-		ì						
filled bit 6: earth location questionable: questionable time code								
bit 5: earth location questionable: questionable time code bit 5: earth location questionable: marginal agreement with		1]				
reasonableness check								
bit 4: earth location questionable: fails reasonableness check		l		1		<u> </u>		
bits 3-2: <zero fill=""></zero>	ļ					1		
bit 1: not earth located because of satellite in-plane maneuver (Metop) or <zero fill=""> (NOAA)</zero>				Ì				
bit 0: not earth located because of satellite out-of-plane maneuver	İ							
(Metop) or <zero fill=""> (NOAA)</zero>		<u> </u>		ļ				
PACS Status Bit Field (NOAA: value defined below) or	153	154	u	2	2 1	0		
<zero fill=""> (Metop)</zero>	1	ļ			İ			
bits 15-3: <zero fill=""></zero>								
bit 2: pseudonoise (0=normal data; 1=pseudonoise data)	1	1						
bit 1: tape direction (0=reverse playback, time decrementing) bit 0: data mode (0=test data; 1=flight data)		Ì	1			Į.		
Data Source	155	156	u		2	0		
_0=unused					1			
=Fairbanks, AK		1		1	İ	ł	[1
2=Wallops Is., VA	1			1		ł		
3=SOCC				l		İ		
4=Svalbard, Norway 5=Monterey, CA	1	l		<u> </u>				_
<zero fill=""></zero>	15				4	<u> </u>		
Reserved for the Ingester>	16	168	3 c		8	L C		
<reserved decommutation="" for=""></reserved>	169	170	5 c		8	1 (
<zero fill=""></zero>	17	7 180	5 i		2	5 ()	
CALIBRATION								
Ramp Calibration Indicators Bit Field (The ramp calibration	18	7 18	8 u		2	1 ()	
signal consists of the output of a D/A generator that increases		1	1			1		
one step per revolution of the radiometer scanning system. The	e	1.	1			ļ		
nominal ramp calibration in the A/D output skips a step			1				1	
approximately once every 62 scan revolutions, and once every	1			1	1	1		
62 steps of the D/A ramp generation. Channels 1, 2, and 3A	1	İ				1	1	1
increment linearly with the scan count, except as previously	Ì		1	1				
noted, until the dual gain break point to 500 counts is reached.	.		1					-
Channels 3B, 4, and 5 ramp values increment linearly with	1	1						-
scan line count, except as previously noted. The following bit	1						1	
fields indicate non-linearity in the ramp calibration signal.)	i	1	ŀ				İ	
bits 15-6: <zero fill=""></zero>		1	ļ					
bit 5: ramp non-linearity for channel 5 bit 4: ramp non-linearity for channel 4								
bit 3: ramp non-linearity for channel 3B							1	
hit 2: ramp non-linearity for channel 3A								
bit 1; ramp non-linearity for channel 2						1		
bit 0: ramp non-linearity for channel 1	18	9 19	0 u	+	2	1	0	
Year of Most Recent Solar Channel Calibration (four digits,	10	ور ا	٦ "		1	1	٦	
e.g., 2000)	19	1 19	2 u	-	2	1	0	
Day of Year of Most Recent Solar Channel Calibration (e.g.,	19	1 19	۳ "		7	1	٦	
365)				_				

Field Name	Start	End Octet			Number of Words	Scale	TT24-	N]
Primary Calibration Algorithm ID	193			Size	or words	ractor 0	Units	Notes	┨
Primary Calibration Algorithm Selected Options	195			2	1				1
bit 15: <zero fill=""></zero>	193	190	"		1	"			
bit 14: Ch 5 resolution (0=high; 1=low)									
bit 13: Ch 5 substitution coefficients (0=no; 1=yes)								İ	
bits 12-10: <zero fill=""></zero>					'			1	ì
bit 9: Ch 4 resolution (0=high; 1=low) bit 8: Ch 4 substitution coefficients (0=no; 1=yes)						!			ı
bits 7-5: <zero fill=""></zero>									ı
bit 4: Ch 3B resolution (0=high; 1=low)									
bit 3: Ch 3B substitution coefficients (0=no; 1=yes) bits 2-0: <zero fill=""></zero>								ŀ	
Secondary Calibration Algorithm ID	197	198	u	2	1	0		 	┨
Secondary Calibration Algorithm Selected Options	199			2	1	0	<u> </u>	 	┨
bit 15: <zero fill=""></zero>	199	200	"		•				
bit 14: Ch 5 resolution (0=high; 1=low)									l
bit 13: Ch 5 substitution coefficients (0=no; 1=yes)									ı
bits 12-10: <zero fill=""></zero>									l
bit 9: Ch 4 resolution (0=high; 1=low) bit 8: Ch 4 substitution coefficients (0=no; 1=yes)]	l i							
bits 7-5: <zero fill=""></zero>									
bit 4: Ch 3B resolution (0=high; 1=low)									
bit 3: Ch 3B substitution coefficients (0=no; 1=yes)									
bits 2-0: <zero fill=""> IR Target Temperature 1 Conversion Coefficient 1</zero>	201	202	i	2	1		K		┨
IR Target Temperature 1 Conversion Coefficient 2	203			2	1		K/counts		┨
IR Target Temperature 1 Conversion Coefficient 3	205			2	<u>1</u>		K/counts ²		┨
IR Target Temperature 1 Conversion Coefficient 4	203	208		2	1:		K/counts ³		┨
IR Target Temperature 1 Conversion Coefficient 5	209			2	1		K/counts ⁴		┨
IR Target Temperature 1 Conversion Coefficient 6	211	212	i	2	1		K/counts ⁵		┨╻
IR Target Temperature 2 Conversion Coefficient 1	213			2	1		K	+	
IR Target Temperature 2 Conversion Coefficient 2	215			2	1		K/counts		-
IR Target Temperature 2 Conversion Coefficient 3	217	218		2	3		K/counts ²	 	┨
IR Target Temperature 2 Conversion Coefficient 4	219			2	1		K/counts ³	+	┨
IR Target Temperature 2 Conversion Coefficient 5	221	222	i	2	1		K/counts ⁴	+	┨
IR Target Temperature 2 Conversion Coefficient 6	223		i	$\frac{2}{2}$	1		K/counts ⁵		1
IR Target Temperature 3 Conversion Coefficient 1	225			2	1		K	 	1
IR Target Temperature 3 Conversion Coefficient 2	227	228		2	1:		K/counts	+	1
IR Target Temperature 3 Conversion Coefficient 3	229			2			K/counts ²		1
IR Target Temperature 3 Conversion Coefficient 4	231	232		2			K/counts ³	_	┨
IR Target Temperature 3 Conversion Coefficient 5	233						K/counts ⁴	+	1
IR Target Temperature 3 Conversion Coefficient 6	235			2			K/counts ⁵	_	1
IR Target Temperature 4 Conversion Coefficient 1	237			2			K	+	1
IR Target Temperature 4 Conversion Coefficient 2	239		i	2			K/counts	+	1
IR Target Temperature 4 Conversion Coefficient 3	241			2			K/counts ²		1
IR Target Temperature 4 Conversion Coefficient 4	243			2			K/counts ³		1
IR Target Temperature 4 Conversion Coefficient 5	245			2			K/counts ⁴		1
IR Target Temperature 4 Conversion Coefficient 6	247			2			K/counts ⁵	1	1
<zero fill=""></zero>	249			4				1	1
RADIANCE CONVERSION									1
Ch 1 Solar Filtered Irradiance in Wavelength	257	260	i	4	1	1		 	1
Ch 1 Equivalent Filter Width in Wavelength	261			4		3		+-	1
Ch 2 Solar Filtered Irradiance in Wavelength	265			4		1		1	1
Ch 2 Equivalent Filter Width in Wavelength	269			4		3			1
Ch 3A Solar Filtered Irradiance in Wavelength	273			4		1			1
Ch 3A Equivalent Filter Width in Wavelength	277			4		3		+	1
Ch 3B Central Wavenumber	281			4			cm ⁻¹	 	1
Ch 3B Constant 1	285			4		5		+-	1
			لـــــا	<u> </u>					_

	Start				Number of Words		Units	Notes
Field Name	289	Octet 292	i ype	Size	or words	Factor	Units	Indies
h 3B Constant 2	293			4	1	2	cm ⁻¹	
on 4 Central Wavenumber	293 297	300		- 4	1	5	CIII	
Ch 4 Constant 1	301	304		4		6		+
Ch 4 Constant 2				4	1	•	cm ⁻¹	+
Ch 5 Central Wavenumber	305			<u> </u>	-	3	CIII	+
Ch 5 Constant 1	309		_	4		6		+
Ch 5 Constant 2	313			4		0		+
<zero fill=""></zero>	317	328	i	4				+
NAVIGATION	220	226					 	+
Reference Ellipsoid Model ID (The ellipsoid is a	329	336	C	8	1	0		
mathematically tractable approximation of the geoid, which is		ŀ						
an equipotential surface at mean sea level. The maximum		1						
departure of the ellipsoid from the geoid is approximately +/-								Ì
65 meters.)			1			ŀ		
WGS-72=World Geodetic Survey 1972	337	338		2	1	1	kilometers	
Nadir Earth Location Tolerance	337			1 2			MIOHECTS	+
Earth Location Bit Field	339	340	u	4	1	۱ ۲	1	
bits 15-3: <zero fill=""> bit 2: dynamic attitude error correction (0=not performed;</zero>				ŀ				ı
1=performed)	l .			ł				
bit 1: reasonableness test (0=inactive; 1=active)						ļ		l,
bit 0: constant attitude error correction (0=not performed;			ĺ	Ì				
1=performed)	241	240	-	 	<u> </u>		 	
<zero fill=""></zero>	341	342		2				+
Constant Roll Attitude Error	343			2			degrees	+
Constant Pitch Attitude Error	345			2			degrees	
Constant Yaw Attitude Error	347			2		 	degrees	+
poch Year for Orbit Vector	349			2				
Day of Epoch Year for Orbit Vector	351			_	2 1	-	1	
Epoch UTC Time of Day for Orbit Vector	353			4			milliseconds	
Semi-major Axis (at the orbit vector epoch time)	357			4	1		kilometers	
Eccentricity (at the orbit vector epoch time)	361			4	·	1 3	5	
Inclination (at the orbit vector epoch time)	365				4 1		degrees	
Argument of Perigee (at the orbit vector epoch time)	369			4	4		degrees	
Right Ascension of the Ascending Node (at the orbit vector	373	370	j i	4	4 1	Ч :	degrees	ŀ
epoch time)	ļ	ļ		<u> </u>				
Mean Anomaly (at the orbit vector epoch time)	377				4		degrees	
Position Vector X Component (at the orbit vector epoch time)	381				4 1		kilometers	
Position Vector Y Component (at the orbit vector epoch time)	385				4		kilometers	
Position Vector Z Component (at the orbit vector epoch time)	389				4		kilometers	
Velocity Vector X-dot Component (at the orbit vector epoch	393	390	5 i	1 4	4 :	1	km/second	
time)								
Velocity Vector Y-dot Component (at the orbit vector epoch	39	7 40) i	'	4	1 :	km/second	
time)						L		
Velocity Vector Z-dot Component (at the orbit vector epoch	40	1 404	4 i	1 .	4	1 :	8km/second	
time)								
Earth/Sun Distance Ratio (at the orbit vector epoch time;	40:	5 40	8 u	-	4	1	6	
relative to the mean distance of 1 AU)	<u> </u>			<u> </u>		<u> </u>	<u> </u>	
<zero fill=""></zero>	409	9 42	4 i		4 .	4	0	
ANALOG TELEMETRY CONVERSION								
Volts-to-engineering units (e.g., temperature in Celsius)		1				1		
conversion coefficients for the analog telemetry items. (NOTE	:				1	1		
l count = 0.02 volts.)				1				
atch Temperature Conversion Coefficient 1	42	5 42	8 i		4		6K	
Patch Temperature Conversion Coefficient 2	42	9 43	2 i		4		6K/volts	
Patch Temperature Conversion Coefficient 3	43	3 43	6 i		4	1	7K/volts ²	

Field Name	Start				Number of Words	Scale	Units	Notes
Patch Temperature Conversion Coefficient 4	437			Size	or words		K/volts ³	Hotes
Patch Temperature Conversion Coefficient 5	441			 	1		K/volts ⁴	
Patch Temperature Conversion Coefficient 6	445			1 7	1		K/volts ⁵	╁ſ
Patch Temperature Extended Conversion Coefficient 1	449			 	1		K	+
Patch Temperature Extended Conversion Coefficient 2	453			 	1		K/volts	+
Patch Temperature Extended Conversion Coefficient 3	457			 	1		K/volts ²	+
Patch Temperature Extended Conversion Coefficient 4	461			1 7	1		K/volts ³	+
Patch Temperature Extended Conversion Coefficient 5	465			 	1		K/volts ⁴	+
Patch Temperature Extended Conversion Coefficient 6	469			1 7	1		K/volts ⁵	+
Patch Power Conversion Coefficient 1	473			1 7	1		mW	+
Patch Power Conversion Coefficient 2	477			 	1		mW/volts	+
Patch Power Conversion Coefficient 3	481			1 7	1		mW/volts ²	
Patch Power Conversion Coefficient 4	485			1 4	1		mW/volts ³	
Patch Power Conversion Coefficient 5	489			4	1		mW/volts ⁴	
Patch Power Conversion Coefficient 6	493			4	1		mW/volts ⁵	+
Radiator Temperature Conversion Coefficient 1	493			4	1			
		_		4	1		K	
Radiator Temperature Conversion Coefficient 2	501	504		4	<u> </u>		K/volts	
Radiator Temperature Conversion Coefficient 3	505	_		4	1		K/volts ²	
Radiator Temperature Conversion Coefficient 4	509			4	<u> </u>		K/volts ³	
Radiator Temperature Conversion Coefficient 5	513			4	1		K/volts ⁴	
Radiator Temperature Conversion Coefficient 6	517			4	I		K/volts ⁵	1
Blackbody Temperature 1 Conversion Coefficient 1	521	_		4	1		С	
Blackbody Temperature 1 Conversion Coefficient 2	525			4	1		C/volts	
Blackbody Temperature 1 Conversion Coefficient 3	529			4	1		C/volts ²	
Blackbody Temperature 1 Conversion Coefficient 4	533	_		4	1		C/volts ³	
Blackbody Temperature 1 Conversion Coefficient 5	537	_		4			C/volts⁴	
Blackbody Temperature 1 Conversion Coefficient 6	541			4	1		C/volts ⁵	
Blackbody Temperature 2 Conversion Coefficient 1	545			4	1		С	
Blackbody Temperature 2 Conversion Coefficient 2	549			4	1		C/volts	
Blackbody Temperature 2 Conversion Coefficient 3	553	556	i	4	1	7	C/volts ²	
Blackbody Temperature 2 Conversion Coefficient 4	557	560	i	4	1	8	C/volts ³	
Blackbody Temperature 2 Conversion Coefficient 5	561	564	i	4	1	9	C/volts⁴	
Blackbody Temperature 2 Conversion Coefficient 6	565	568	i	4	1	10	C/volts ⁵	
Blackbody Temperature 3 Conversion Coefficient 1	569	572	i	4	1	6	C	
Blackbody Temperature 3 Conversion Coefficient 2	573	576	i	4	1	6	C/volts	
Blackbody Temperature 3 Conversion Coefficient 3	577			4	1	7	C/volts ²	1
Blackbody Temperature 3 Conversion Coefficient 4	581	584	i	4	1		C/volts ³	+-1
Blackbody Temperature 3 Conversion Coefficient 5	585	588	i	4	1	9	C/volts ⁴	
Blackbody Temperature 3 Conversion Coefficient 6	589			4	1		C/volts ⁵	
Blackbody Temperature 4 Conversion Coefficient 1	593			4	1		C	
Blackbody Temperature 4 Conversion Coefficient 2	597			4			C/volts	1
Blackbody Temperature 4 Conversion Coefficient 3	601			4	1		C/volts ²	
Blackbody Temperature 4 Conversion Coefficient 4	605			4			C/volts ³	+
Blackbody Temperature 4 Conversion Coefficient 5	609			4			C/volts ⁴	
Blackbody Temperature 4 Conversion Coefficient 6	613			4			C/volts ⁵	+
Electronics Current Conversion Coefficient 1	617			4			mA	
Electronics Current Conversion Coefficient 2	621			4			mA/volts	+-+
Electronics Current Conversion Coefficient 3	625			4			mA/volts ²	+-+
Electronics Current Conversion Coefficient 4	629			4			mA/volts ³	+-+
Electronics Current Conversion Coefficient 5						l		+
Electronics Current Conversion Coefficient 6	633			4			mA/volts ⁴	1
Motor Current Conversion Coefficient 6	637		_	4			mA/volts ⁵	
	641			4			mA	
Motor Current Conversion Coefficient 2	645			4			mA/volts	
Motor Current Conversion Coefficient 3	649			4			mA/volts ²	
Motor Current Conversion Coefficient 4	653	656	i	4	1	8	mA/volts ³	

	Start	End	Data	Word	Number	Scale	77-14-	N-4
Field Name				Size	of Words	Factor	Units mA/volts ⁴	Notes
Aotor Current Conversion Coefficient 5	657	660		4	- 1		mA/volts ⁵	
Motor Current Conversion Coefficient 6	661	664		4		10	mA/voits	+
Earth Shield Position Conversion Coefficient 1	665			4		0		
Earth Shield Position Conversion Coefficient 2	669	672		4		6		
Earth Shield Position Conversion Coefficient 3	673			4		7		
Earth Shield Position Conversion Coefficient 4	677			4		8		+
Earth Shield Position Conversion Coefficient 5	681	684		4	1	9		+
Earth Shield Position Conversion Coefficient 6	685			4	1	10		
Electronics Temperature Conversion Coefficient 1	689			4			C	
Electronics Temperature Conversion Coefficient 2	693			4			C/volts	
Electronics Temperature Conversion Coefficient 3	697	700		4		7	C/volts ²	
Electronics Temperature Conversion Coefficient 4	701	704		4		8	C/volts ³	
Electronics Temperature Conversion Coefficient 5	705			4			C/volts4	
Electronics Temperature Conversion Coefficient 6	709			4			C/volts ⁵	
Cooler Housing Temperature Conversion Coefficient 1	713			4			C	
Cooler Housing Temperature Conversion Coefficient 2	717			4	1		C/volts	
Cooler Housing Temperature Conversion Coefficient 3	721			4	1		C/volts ²	
Cooler Housing Temperature Conversion Coefficient 4	725	728	i	4	1		C/volts ³	
Cooler Housing Temperature Conversion Coefficient 5	729	732	i	4	1		C/volts ⁴	
Cooler Housing Temperature Conversion Coefficient 6	733	736	i	4	1		C/volts ⁵	
Baseplate Temperature Conversion Coefficient 1	737	740) i	4	1	. 6	ic	
Baseplate Temperature Conversion Coefficient 2	741	744	i	4			C/volts	
Baseplate Temperature Conversion Coefficient 3	745	748	i	4	1	1 7	C/volts ²	
Baseplate Temperature Conversion Coefficient 4	749			4	1	. 8	C/volts ³	
Baseplate Temperature Conversion Coefficient 5	753			4	1 1	9	C/volts4	
Baseplate Temperature Conversion Coefficient 6	757			4	1		C/volts ⁵	
Notor Housing Temperature Conversion Coefficient 1	761			1 2			SC .	
Motor Housing Temperature Conversion Coefficient 2	765			4	1 1	1 (C/volts	
Motor Housing Temperature Conversion Coefficient 3	769			1 4	1		C/volts ²	
Motor Housing Temperature Conversion Coefficient 4	773				1		C/volts ³	
Motor Housing Temperature Conversion Coefficient 5	777			1 4	1		C/volts4	
Motor Housing Temperature Conversion Coefficient 6	781			1 2	4		C/volts ⁵	
A/D Converter Temperature Conversion Coefficient 1	785		_	 	4		5C	
A/D Converter Temperature Conversion Coefficient 2	789			1 4			6C/volts	1
A/D Converter Temperature Conversion Coefficient 3	793			-	4		7C/volts ²	
A/D Converter Temperature Conversion Coefficient 4	79				4		BC/volts ³	
A/D Converter Temperature Conversion Coefficient 4	801	1 80	4 i		4	 	9C/volts ⁴	-
A/D Converter Temperature Conversion Coefficient 5	803		8 i		4		0C/volts ⁵	
A/D Converter Temperature Conversion Coefficient 6	809			-	4	. 	6	+-
Detector #4 Bias Voltage Conversion Coefficient 1	81.				4		6	
Detector #4 Bias Voltage Conversion Coefficient 2	81			+	4	1	7	
Detector #4 Bias Voltage Conversion Coefficient 3					4	1	8	
Detector #4 Bias Voltage Conversion Coefficient 4	82						9	
Detector #4 Bias Voltage Conversion Coefficient 5	82:				4			
Detector #4 Bias Voltage Conversion Coefficient 6	829				4	1 1		
Detector #5 Bias Voltage Conversion Coefficient 1	833				4		6	
Detector #5 Bias Voltage Conversion Coefficient 2	83				4	1	6	
Detector #5 Bias Voltage Conversion Coefficient 3	84				4	1	/	
Detector #5 Bias Voltage Conversion Coefficient 4	84:				4		8	
Detector #5 Bias Voltage Conversion Coefficient 5	84				4		9	
Detector #5 Bias Voltage Conversion Coefficient 6	85					1 1		
Blackbody Temperature, Channel 3B, Conversion Coefficient	1 85				<u> </u>		6C	
Blackbody Temperature, Channel 3B, Conversion Coefficient	2 86						6C/volts	
Blackbody Temperature, Channel 3B, Conversion Coefficient	3 86						7C/volts ²	
Blackbody Temperature, Channel 3B, Conversion Coefficient	4 86						8C/volts ³	_
Blackbody Temperature, Channel 3B, Conversion Coefficient	5 87	3 87	6 i	Щ.	4	1	9C/volts4	

					Number			T
Field Name	Octet		Type	Size	of Words	Factor	Units	Notes
Blackbody Temperature, Channel 3B, Conversion Coefficient 6		880	i	4	1		C/volts ⁵	
Blackbody Temperature, Channel 4, Conversion Coefficient 1	881	884		4	1		C	
Blackbody Temperature, Channel 4, Conversion Coefficient 2	885			4	1		C/volts	
Blackbody Temperature, Channel 4, Conversion Coefficient 3	889			4	1		C/volts ²	
Blackbody Temperature, Channel 4, Conversion Coefficient 4	893			4	1		C/volts ³	
Blackbody Temperature, Channel 4, Conversion Coefficient 5	897			4	1		C/volts⁴	
Blackbody Temperature, Channel 4, Conversion Coefficient 6	901	904		4	1		C/volts⁵	
Blackbody Temperature, Channel 5, Conversion Coefficient 1	905	908	i	4	1	6	С	
Blackbody Temperature, Channel 5, Conversion Coefficient 2	909			4	1	6	C/volts	
Blackbody Temperature, Channel 5, Conversion Coefficient 3	913			4	1		C/volts ²	
Blackbody Temperature, Channel 5, Conversion Coefficient 4	917	920	i	4	1	8	C/volts ³	
Blackbody Temperature, Channel 5, Conversion Coefficient 5	921	924		4	1	9	C/volts4	
Blackbody Temperature, Channel 5, Conversion Coefficient 6	925	928	i	4	1	10	C/volts ⁵	
Reference Voltage Conversion Coefficient 1	929	932	i	4	1	6		
Reference Voltage Conversion Coefficient 2	933	936	i	4	1	6		
Reference Voltage Conversion Coefficient 3	937	940	i	4	1	7		
Reference Voltage Conversion Coefficient 4	941	944	i	4	1	8	-	
Reference Voltage Conversion Coefficient 5	945	948	i	4	1	9		
Reference Voltage Conversion Coefficient 6	949	952	i	4	1	10		
METOP MANEUVERS IDENTIFICATION								
The fields in this section are Metop specific. For NOAA-								
originated AVHRR data, these fields are spare (zero fill).								
Start of Maneuver Year (four digits, e.g., 2000)	953	954	u	2	1	0		
Start of Maneuver Day of Year (e.g., 365)	955	956	u	2	1	0		
Start of Maneuver UTC Time of Day	957	960	u	4	1	0	milliseconds	
End of Maneuver Year (four digits, e.g., 2000)	961	962	u	2	1	0		
End of Maneuver Day of Year (e.g., 365)	963	964	u	2	1	0		
End of Maneuver UTC Time of Day	965	968	u	4	1	0	milliseconds	
Change in Spacecraft Velocity (ΔV)	969	980	i	4	3	TBD	TBD	1
Word 1: TBD								
Word 2: TBD								
Word 3: TBD	001					(Pro-	TDD	
Spacecraft Mass Word 1: Mass before maneuver	981	988	u	4	2	TBD	IRD	
Word 1: Mass before maneuver Word 2: Mass after maneuver								
FILLER				-				
<zero fill=""></zero>	989	4608	i	4	905			+

4.2 AVHRR 1b Data Record Format (Full Resolution)

		_	_			6 1	T	т
TU 11 N					Number of Words	Scale Factor	Units	Notes
Field Name	Octet	Octet	Type	Size	UI WUIUS	ractor	Units	110103
SCAN LINE INFORMATION		-				-		+
Scan Line Number (cumulative, starting with 1; range: 0-	i 1	2	u		1 '		1	
(5,535)	<u> </u>	ļ. — <u>,</u>			<u> </u>	0		
Scan Line Year (four digits, e.g., 2000)	3	4	u	2				+
Scan Line Day of Year (e.g., 365)	5	6		2	1		1991	+
Satellite Clock Drift Delta	7	8		2	1		milliseconds	
Scan Line UTC Time of Day	9			4	1		milliseconds	ļ
Scan Line Bit Field	13	14	u	2	1	0	N .	
it 15: satellite direction (0=northbound; 1=southbound)								1
oit 14: clock drift correction (0=not corrected; 1=scan time corrected				Ì				
or clock drift)			1					1
oits 13-2: <zero fill=""> oits 1-0: channel 3 select (0=3B; 1=3A; 2=transition)</zero>	ļ.					ŀ		
Sero Fill>	15	24	i	2	5			
QUALITY INDICATORS	 	 		 				1
QUALITI INDICATORS	25	28	u		1	(—
Quality Indicator Bit Field (if a bit is on $(=1)$), the statement is		1 2	1 "	-	1 '] `	1	1
rue)	ŀ	1	1	1	ļ			
oit 31: do not use scan for product generation oit 30: time sequence error detected within this scan (see below)	1		1					1
oit 30: time sequence error detected within this scan (see below) pit 29: data gap precedes this scan	l				ļ		1	
bit 28: insufficient data for calibration (see below)							ŀ	
bit 27: earth location data not available (see below)			1			l		
bit 26: first good time following a clock update (nominally 0)						l		ļ
pit 25: instrument status changed with this scan	1		1		1			
it 24: bit sync dropped lock during frame (NOAA) or <zero fill=""></zero>	1			1			1	
letop)	1		ł		1]		
bit 23: frame sync word has errors (NOAA) or <zero fill=""> (Metop)</zero>	l		1				1	
bit 22: frame sync returned to lock (NOAA) or <zero fill=""> (Metop) bit 21: frame sync word not valid (NOAA) or <zero fill=""> (Metop)</zero></zero>	1	1	ļ		1	1		
bit 20: bit slip occurred during this frame (NOAA) or <zero fill=""> (Metop)</zero>	, l		1	1		i i	1	
bits 19-9: <zero fill=""></zero>	1	ŀ	1				İ	
hit 8: TTP parity error detected (NOAA) or <zero fill=""> (Metop)</zero>			1	1				
bits 7-6: reflected sunlight detected ch 3B (0=no anomaly; 1=anomaly;	: [ł
3=unsure)	1	1		1	i			
bits 5-4: reflected sunlight detected ch 4 (0=no anomaly; 1=anomaly;					ŀ	i		
3=unsure)					1	1		1
bits 3-2: reflected sunlight detected ch 5 (0=no anomaly; 1=anomaly;					Į.			
3=unsure) bit 1: resync occurred on this frame (NOAA) or <zero fill=""> (Metop)</zero>			1			1		
bit 0: pseudonoise occurred on this frame (NOAA) or <zero fill=""></zero>			1		1			
(Metop)					<u> </u>	<u> </u>		
Scan Line Quality Flags [<reserved>] (zero fill)</reserved>	2			<u> </u>	1	1	0	
Scan Line Quality Flags [Time Problem Code] (If a bit is on	3	0 3	0 u		1	1	o	İ
(=1) the statement is true. All hits off implies the scan time is	1			1				
				1			1	
hit 7: time field is had but can probably be inferred from the previous	1	1		ŀ		1		l
good time	1	1	1	1				
bit 6: time field is bad and can't be inferred from the previous good	1					1		
time	1		1	1		1		
bit 5: this record starts a sequence that is inconsistent with previous	_			1				
times (i.e., there is a time discontinuity). This may be associated with	٩							
spacecraft clock update. (See bit 26, Quality Indicator bit Field.) bit 4: start of a sequence that apparently repeats scan times that have							ľ	
IDIT 9. CENTE OF A SCUTCHICE HIGH ODDOLCHUS (CDCOC) SCOT OFFICS AND HIGH		1	1	1		1	1	- 1
been previously accepted	1	1	1	1	L	i i		l l
Scan Line Quality Flags [<reserved>] (zero fill) Scan Line Quality Flags [Time Problem Code] (If a bit is on (=1), the statement is true. All bits off implies the scan time is as expected.) bit 7: time field is bad but can probably be inferred from the previous good time bit 6: time field is bad and can't be inferred from the previous good time bit 5: this record starts a sequence that is inconsistent with previous times (i.e., there is a time discontinuity). This may be associated with spacecraft clock update. (See bit 26. Quality Indicator Bit Field.)</reserved>	a				1	1	0	

	Start	End	Data	Word	Number	Scale		Г	ı
Field Name					of Words		Units	Notes	
Scan Line Quality Flags [Calibration Problem Code] (If a bit is	31			1	1	0		1	
on (=1), the statement is true. These bits complement the								1	
channel indicators; all bits set to 0 indicates normal						ľ			
calibration.)] [
bit 7: Scan line not calibrated: all IR channels failed calibration.									
bit 6: Scan line marginally calibrated: one or more IR channels marginally calibrated OR one or more, but not all, IR channels failed)					1		1	ı
calibration.						1			
bit 5: Scan line not calibrated: bad or insufficient PRT data.]	
bit 4: Scan line marginally calibrated: marginal PRT data.	İ .								
bit 3: Some uncalibrated channels for this scan line (i.e., one or more, but not all, IR channels failed calibration).									
bit 2: No visible calibration due to either the presence of MIRP	1								
pseudonoise in place of AVHRR data (NOAA only) or calibration]]	
processing turned off. bit 1: <zero fill=""></zero>									
bit 0: scan line was not calibrated because of satellite maneuver									
(Metop) or <zero fill=""> (NOAA)</zero>									
Scan Line Quality Flags [Earth Location Problem Code] (If a	32	32	u	1	1	0			
bit is on (=1), the statement is true. All bits set to 0 implies the			1						
earth location was normal.)]								
bit 7: not earth located because of bad time; earth location fields zero- filled									
bit 6: earth location questionable: questionable time code (see time									
problem flags above)									
bit 5: earth location questionable: marginal agreement with									
reasonableness check								li	
bit 4: earth location questionable: fails reasonableness check bits 3-2: <zero fill=""></zero>]								
bit 1: not earth located because of satellite in-plane maneuver (Metop)									
or <zero fill=""> (NOAA)</zero>								4	
bit 0: not earth located because of satellite out-of-plane maneuver (Metop) or <zero fill=""> (NOAA)</zero>								"	
Calibration Quality Flags (all bits off implies a good	33	38	u	2	- 3	0			
calibration)			"	_ ~	[]				
Word 1: Channel 3B									
bits 15-8: <zero fill=""></zero>									
bit 7: this channel is not calibrated bit 6: this channel is calibrated but questionable	i								
bit 5: all bad blackbody counts for scan line									
bit 4: all bad space view counts for scan line						ĺ			
bit 3: <zero fill=""></zero>						ļ		ļ ļ	
bit 2: marginal blackbody view counts for this line bit 1: marginal space view counts for this line	}								
bit 0: <zero fill=""></zero>									
Words 2-3: Channels 4-5 (in order)									
Count of Bit Errors in Frame Sync (NOAA) or <zero fill=""></zero>	39	40	u	2	1	q			
(Metop)									
<zero fill=""></zero>	41	48	i	4	2	0			
CALIBRATION COEFFICIENTS									
Visible Operational Cal Ch 1 Slope 1	49			4	1				
Visible Operational Cal Ch 1 Intercept 1	53	56		4	1	6	 _		
Visible Operational Cal Ch 1 Slope 2	57	60		4	1				
Visible Operational Cal Ch 1 Intercept 2	61			4	1	6		 	
Visible Operational Cal Ch 1 Intersection Visible Test Cal Ch 1 Slope 1	65			4	1	0		\vdash	
	69			4	1			\vdash	
Visible Test Cal Ch 1 Slove 2	73			4	1	6		\vdash	
Visible Test Cal Ch 1 Slope 2 Visible Test Cal Ch 1 Intercept 2	77	80		4	1			<u> </u>	
Visible Test Cal Ch 1 Intercept 2 Visible Test Cal Ch 1 Intersection	81			4	1	6			
	85			4	1	<u> </u>		├ ──-	_
Visible Prelaunch Cal Ch 1 Slope 1	89	92	í_	4	1	7			

	T-HEL I	Data	word'	Number	Scale		1
Start Octet						Units	Notes
93			4	1	6		
97	100	i	4	1	7		
101	104	i	4	1	6		
105	108	i	4	1	0		
109	112	i	4	1	7		
113	116	i	4	1	6		
117	120	i	4	1	7		
121	124	i	4	1	6		
125	128	i	4	1	0		
129	132	i	4	1	7		
133	136	i	4	1	6		
137	140	i	4	1	7		
141	144	i	4	1	6		
145	148	i	4	1	0		
149	152	i	4	1	7		
153	156	i	4	1	6		
157	160	i	4	1	7		
161	164	i	4	1	6		
165	168	i	4	1	0		
169	172	i	4	1	7		
			- 4	1	6		
		i	4	1	7		
			4	1	6		
			4	1	0		
			1	1 1	7		
			-		6		
			4	1	7		
			4	1	1 6		
		i	4	1	1 0		
209	212	2 i	4	1	1 7		T_{-}
213	216	i	4	4	1 6		
217	220) i	4	4	1 7		
221	224	i	1	4	1 6		
225	228	i	T -	4	1 0)	
229	232	2 i	1	4	1 6	i	
233			1 4	4	1 6	i	
) i	1	4	1 6		
		i		4	1 6	5	
		3 i		4	1 6	5	
		2 i	1	4	1 6	5	
				4	1 6	5	
			<u> </u>	4	1 6	5	
				4	1 7	7	
				4	1 (5	
				4	1 (5	\neg
			1	4	1	7	丁一
			1	4	1 (5	
			+		1 6	5	\neg
				+	1	/	$\neg \neg$
			+		1 (5	\dashv
					-		
			 	4	1 -	7	
	93 97 101 105 109 113 117 121 125 129 133 137 141 145 149 153 157 161 165 169 173 177 181 185 189 197 201 205 209 213 217 221 225 225 225 225 225 225 225 225 225	93 96 97 100 101 104 105 108 109 112 113 116 117 120 121 124 125 128 129 132 133 136 137 140 141 144 145 148 149 152 153 156 157 160 161 164 165 168 169 172 173 176 177 180 181 184 185 188 189 192 193 196 197 200 201 204 205 208 209 212 213 216 217 220 221 222 225 228 229 232 233 236 241 244 245 248 249 255 257 266 261 266 265 265 269 277 277 286 281 285 289 297 293 298	93 96 i 97 100 i 101 104 i 105 108 i 109 112 i 113 116 i 117 120 i 121 124 i 125 128 i 129 132 i 133 136 i 137 140 i 141 144 i 145 148 i 149 152 i 153 156 i 157 160 i 161 164 i 165 168 i 169 172 i 173 176 i 177 180 i 181 184 i 185 188 i 189 192 i 193 196 i 197 200 i 201 204 i 205 208 i 209 212 i 213 216 i 217 220 i 221 224 i 225 228 i 229 232 i 233 236 i 237 240 i 241 244 i 245 248 i 249 252 i 257 260 i 261 264 i 265 268 i 269 272 i 273 276 i 277 280 i 281 284 i 285 288 i 289 292 i 293 296 i	93 96 i 44 97 100 i 44 101 104 i 44 105 108 i 44 1109 112 i 44 113 116 i 44 117 120 i 44 121 124 i 44 125 128 i 44 129 132 i 44 133 136 i 44 141 144 i 44 145 148 i 44 145 148 i 44 145 148 i 44 153 156 i 44 157 160 i 46 161 164 i 46 165 168 i 46 169 172 i 46 177 180 i 46 181 184 i 46 185 188 i 46 189 192 i 46 197 200 i 46 197 200 i 46 201 204 i 46 205 208 i 46 209 212 i 46 217 220 i 67 221 224 i 67 221 224 i 67 225 228 i 67 227 220 i 67 221 224 i 67 225 228 i 67 227 220 i 67 221 224 i 67 225 228 i 67 227 220 i 67 221 224 i 67 225 228 i 67 227 220 i 67 227 220 i 67 221 224 i 67 225 228 i 67 227 220 i 67 221 224 i 67 225 228 i 67 227 220 i 67 221 224 i 67 225 228 i 67 227 220 i 67 227 220 i 67 227 220 i 67 228 228 i 67 229 232 i 67 229 232 i 67 229 232 i 67 221 224 i 67 225 228 i 67 227 220 i 67 227 220 i 67 227 220 i 67 228 228 i 67 229 232 i 67 227 220 i 67 220 i 67 220 i 67 220 i 67 220 i 67 220 i 67 220 i 67 220 i 67 220 i 67 220 i 67 220	93 96 i 4 1 97 100 i 4 1 101 104 i 4 1 105 108 i 4 1 1109 112 i 4 1 1113 116 i 4 1 117 120 i 4 1 1121 124 i 4 1 125 128 i 4 1 129 132 i 4 1 133 136 i 4 1 141 144 i 4 1 145 148 i 4 1 149 152 i 4 1 153 156 i 4 1 157 160 i 4 1 161 164 i 4 1 165 168 i 4 1 177 180 i 4 1 177 180 i 4 1 177 180 i 4 1 177 180 i 4 1 181 184 i 4 1 185 188 i 4 1 189 192 i 4 1 193 196 i 4 1 197 200 i 4 1 201 204 i 4 1 205 208 i 4 1 207 200 i 4 2 211 224 i 4 1 225 228 i 4 1 221 224 i 4 1 2225 228 i 4 1 2277 220 i 4 1 2287 2288 i 4 1 2299 232 i 4 1 239 296 i 4 1	97 100 i	93 96 i 4 1 6 97 100 i 4 1 7 101 104 i 4 1 6 105 108 i 4 1 7 113 116 i 4 1 6 117 120 i 4 1 7 121 124 i 4 1 6 125 128 i 4 1 7 133 136 i 4 1 6 137 140 i 4 1 6 137 140 i 4 1 6 137 140 i 4 1 6 137 140 i 4 1 6 141 144 i 4 1 6 153 156 i 4 1 6 157 160 i 4 1 7 153 156 i 4 1 6 161 164 i 4 1 6 165 168 i 4 1 6 177 180 i 4 1 7 177 180 i 4 1 7 181 184 i 4 1 6 197 200 i 4 1 7 193 196 i 4 1 6 197 200 i 4 1 7 201 204 i 4 1 6 225 208 i 4 1 7 221 224 i 4 1 6 225 208 i 4 1 6 227 228 i 4 1 6 227 220 i 4 1 7 221 224 i 4 1 6 225 228 i 4 1 6 227 220 i 4 1 7 221 224 i 4 1 6 225 228 i 4 1 6 227 220 i 4 1 7 227 220 i 4 1 6 227 228 i 4 1 6 227 228 i 4 1 6 227 228 i 4 1 6 227 228 i 4 1 6 227 220 i 4 1 6 227 228 i 4 1 6 227 220 i 4 1 6 227 228 i 4 1 6 227 228 i 4 1 6 227 228 i 4 1 6 227 228 i 4 1 6 227 228 i 4 1 6 227 228 i 4 1 6 227 228 i 4 1 6 227 228 i 4 1 6 227 220 i 4 1 7 227 280 i 4 1 6 227 280 i 4 1 6 227 277 280 i 4 1 6 228 228 28 i 4 1 6 228 228 28 i 4 1 6 228 228 28 i 4 1 6 227 277 280 i 4 1 6 228 229 29 2 i 4 1 6 229 292 29 2 i 4 1 6 228 228 28 i 4 1 6 228 228 28 i 4 1 6 228 228 28 i 4 1 6 228 228 28 i 4 1 6 228 228 28 i 4 1 6 228 228 28 i 4 1 6 228 228 28 i 4 1 6 229 292 i 4 1 6 229 292 i 4 1 6 229 292 i 4 1 6 2293 296 i 4 1 6

	Start	End	Data	Word	Number	Scale		T	1
Field Name	Octet	Octet	Type	Size	of Words	Factor	Units	Notes	
NAVIGATION									
Computed Yaw Steering (Metop: content defined below) or	301	306	i	2	3	0	degrees		
<zero fill=""> (NOAA)</zero>		l							ı
Word 1: Computed roll angle									
Word 2: Computed pitch angle									
Word 3: Computed yaw angle								-	1
Total Applied Attitude Correction	307	312	i	2	3	3	degrees		l
Word 1: Roll									
Word 2: Pitch Word 3: Yaw									
Navigation Status Bit Field (bits 20-18 are Metop specific and	313	316	u	4	1	0			┨
will contain zero fill for NOAA; bits 11-0 are NOAA specific	313	310	u	4	1	U	1		l
									l
and will contain zero fill for Metop) bits 31-21: <zero fill=""></zero>									l
bit 20-19: yaw steering parameters usage indicator (0=no yaw steering	1						Ĭ		Ì
correction; 1=computed parameters from Metop data stream;	ľ								l
2=measured parameters from Metop data stream; 3=computed									l
parameters from AELDS)									
bit 18: Metop maneuver indicator (0=scan does not occur during a									ı
Metop in-plane or out-of-plane maneuver; 1=scan, or some part of it,									1
occurs during a maneuver)									l
bit 17: earth location at the satellite subpoint is accurate and								1	ł
reasonable, i.e., is within tolerance defined by "Nadir Earth Location Tolerance" in header (0=out of tolerance; 1=in tolerance)								İ	
bit 16: earth location corrected for Euler angles (0=FALSE; 1=TRUE)									1
bits 15-12: earth location indicator (0=earth location available; 1=user			l						1
ephemeris files greater than 24 hours old; 2=no earth location	l .							-	
available)									ĺ
bits 11-8: spacecraft attitude control (0=operating in YGC or NOMINAL									
mode; 1=operating in another mode; 2=attitude exceeds nominal									
tolerance; 3=both 1 and 2)]						1 4	
bits 7-4: attitude SMODE (0=nominal mode; 1=rate nulling mode; 2=YGC mode; 3=search mode; 4=coast mode)	ĺ							•	
bits 3-0: attitude PWTIP\$AC (0=nominal mode/no test; 1=yaw axis test									
in progress; 2=roll axis test in progress; 3=pitch axis test in progress)							ĺ		l
Time Associated with Euler Angles	317	320	i	4	1	0	seconds	 	1
Euler Angles (NOTE: For Metop-originated AVHRR data, this	321			2	3		degrees	 	1
field is also referred to as the measured yaw steering		320		1		_	dogroos		
parameters.)			1		!			}	١
Word 1: Roll									l
Word 2: Pitch									l
Word 3: Yaw								ŀ	l
Spacecraft Altitude above Reference Ellipsoid	327	328	u	2	1	1	kilometers		1
Angular Relationships (relative azimuth range +/- 180.00	329			2	153		degrees		1
degrees)			_			_			
Word 1: Solar zenith angle, FOV 25				ļ	,			ļ	l
Word 2: Satellite zenith angle, FOV 25								ł	l
Word 3: Relative azimuth angle, FOV 25									
Word 4: Solar zenith angle, FOV 65									ı
 (set of 3 angles every 40 FOVs)					'				
(Set of 3 digles every 40 FOVS)									l
Word 153: Relative azimuth angle, FOV 2025									
<zero fill=""></zero>	635	640	i	2	3			<u> </u>	ĺ
Earth Location (north latitude and east longitude are positive)	641			 	102		degrees	+	ł
Word 1: Latitude, FOV 25	"	1070	'	7	102	4	ucgices		
Word 2: Longitude, FOV 25									
Word 3: Latitude, FOV 65								1	
the the provided to the second section of the section of the									
(lat/lon word pair every 40 FOVs)			Ì					1 .	
 Word 102: Longitude, FOV 2025									
<pre></pre> <pre> <pre> <pre> <pre> </pre> <pre> <pre> <pre> </pre> <pre> <pre> <pre> </pre> <pre> </pre> <pre> <pre> <pre> </pre> <pre> </pre> <pre> <pre> <pre> </pre> <pre> </pre> <pre> <pre> <pre> <pre> </pre> <pre> </pre> <pre> <pre> <pre> </pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> </pre> <pre> </pre> <pre> <pre> <pre> <pre> <pre> </pre> <pre> <pre> <pre> </pre> <pre> <pre> <pre> <pre> <pre> </pre> <pre> <pre> <pre> <pre> <pre> </pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <pre> <</pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre></pre>	1040	1056	- , 					 	P
-ENIV I III	1049	1056	1	4	2	0			J

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	Start	End	Data	Word	Number	Scale		
Field Name					of Words		Units	Notes
FRAME TELEMETRY								
Frame Sync (The first 60 bits (in 6 10-bit values) from a 63-bit pseudonoise generator starting in the all 1's state. The generator polynomial is: $x^6 + x^5 + x^2 + 1$.) (NOAA: content defined below) or \angle Zero Fill> (Metop) Word 1: 644	1057	1068	u	2	6	0		
Word 2: 367 Word 3: 860 Word 4: 413 Word 5: 527 Word 6: 149						-		
ID (NOAA: content defined below) or <zero fill=""> (Metop) Word 1 bits 15-10: <zero fill=""> bit 9: MIRP/AVHRR sync (0=internal sync; 1=AVHRR sync) bits 8-7: frame ID (0=GAC frame; 1=HRPT minor frame 1; 2=HRPT minor frame 2; 3=HRPT minor frame 3) bits 6-3: spacecraft address bit 2: resync (0=frame stable; 1=frame resync occurred) bit 1: AVHRR input (0=pseudonoise; 1=normal) bit 0: channel 3 status (0=AVHRR channel 3B; 1=AVHRR channel 3A) Word 2 bits 15-10: <zero fill=""></zero></zero></zero>	1069	1072	u	2	2			
bits 9-0: <undefined></undefined>		<u> </u>	<u> </u>					
Time Code (NOAA: content defined below) or <zero fill=""> (Metop) Word 1 its 15-10: <zero fill=""> bits 9-1: binary day count bit 0: 0 (zero) Word 2 bits 15-10: <zero fill=""> bit 9: 1 (one) bit 8: 0 (zero) bit 7: 1 (one) bits 6-0: most significant part of binary millisecond of day count Word 3 bits 15-10: <zero fill=""> bits 9-0: part of binary millisecond of day count Word 4 bits 15-10: <zero fill=""></zero></zero></zero></zero></zero>	1073	1080	u 					
bits 9-0: least significant part of binary millisecond of day count	108	1 109	0 u	 	2	5	counts	
Ramp Calibration Word 1: Ramp calibration, channel 1 Word 2: Ramp calibration, channel 2 Word 3: Ramp calibration, channel 3 Word 4: Ramp calibration, channel 4 Word 5: Ramp calibration, channel 5	108						- C GALLOS	
Internal Target Temperature (Three readings from one of the four platinum resistance thermometers (PRT). A different PR is sampled for each scan. Every fifth scan will contain a reference value of 0 in place of each reading.) Word 1: PRT reading 1 Word 2: PRT reading 2 Word 3: PRT reading 3							0 counts	1
Patch Temperature	109			 	2	1	Ocounts	1
<undefined> (NOAA) or <zero fill=""> (Metop)</zero></undefined>	109	9 110	0 u		4	1	<u> </u>	

	Start	End	Data	Word	Number	Scale		1
Field Name	Octet	Octet	Туре	Size	of Words	Factor	Units	Notes
Back Scan (Ten samples of calibration target view data from	1101			2	30		counts	1
each of AVHRR channels 3, 4, and 5.)								1
Word 1: channel 3, sample 1	Ì				}			Ì
Word 2: channel 4, sample 1								
Word 3: channel 5, sample 1								
Word 4: channel 3, sample 2								ł
Word 30: channel 5, sample 10							ł	ŀ
Space Data (Ten samples of space view data from each of	1161	1260	u	2	50		counts	
AVHRR channels 1, 2, 3, 4, and 5.)								1
Word 1: channel 1, sample 1								Ì
Word 2: channel 2, sample 1					,		ļ	ļ
has the second of the second of								
Word 5: channel 5, sample 1 Word 6: channel 1, sample 2]	1
l voru 6: Channer 1, Sample 2								
Word 50: channel 5, sample 10					ļ			1.
Sync Delta (NOAA: content defined below) or	1261	1262	u	2	1	C	j	
<zero fill=""> (Metop)</zero>			-	_			1	ľ
bits 15-10: <zero fill=""></zero>								1
bit 9: AVHRR sync (0=early; 1=late)								
bits 8-0: 9-bit binary count of 0.9984 MHz periods								
<zero fill=""></zero>	1263	1264	i	2	1		<u> </u>	
EARTH OBSERVATIONS	<u> </u>							
Earth Data	1265	14920	u	4	3414	C	counts	
Word 1	[ļ	1
bits 31-30: <zero fill=""></zero>	1							ŀ
bits 29-20: channel 1, FOV 1	ŀ		1					
bits 19-10: channel 2, FOV 1 bits 9-0: channel 3, FOV 1								
bits 5 0. Citamiei 5, 104 1								
Word 2	1				<u>'</u>]	Ì
bits 31-30: <zero fill=""></zero>	1							İ
bits 29-20: channel 4, FOV 1			,					
bits 19-10: channel 5, FOV 1								
bits 9-0: channel 1, FOV 2	ļ				ļ			ļ
Word 3414					1			1
bits 31-30: <zero fill=""></zero>	1							Ì
bits 29-20: channel 5, FOV 2048							1	
bits 19-0: <zero fill=""></zero>	<u> </u>							
<zero fill=""></zero>	14921	14928	i	4	2		<u> </u>	
DIGITAL B HOUSEKEEPING TELEMETRY								
Digital B Telemetry Update Flags (If bit = 0, associated	14929	14930	u	2	1	C		
telemetry item is up-to-date. If bit = 1, associated telemetry								
item was not updated during most recent telemetry cycle -	}		1		\			1
possibly due to lost frame.))				
bit 15: scan motor/telemetry status	1							ľ
bit 14: electronics/telemetry status]	
bit 13: channel 1 status	[ļ			1
bit 12: channel 2 status bit 11: channel 3A status	1							ŀ
bit 10: channel 3B status								1
bit 9: channel 4 status							1	
bit 8: channel 5 status					i .		İ	
bit 7: channel 3A/3B select status	1	1		1	\ 		1	Ì
bit 6: voltage calibration status								1
bit 5: cooler heat status								1
bit 4: scan motor mode status]		1	
bit 3: telemetry lock status bit 2: earth shield status	1			[l .	1
bit 1: patch control status	1]				
bit 0: <zero fill=""></zero>							1	
				L			L	

	Store	Fnd	Data	Word	Number	Scale		т
Field Name	Start	Octet			of Words		Units	Notes
VHRR Digital B Data		14932		3126	1	ractor	Units	110165
t 15: scan motor/telemetry status (0=off; 1=on)	14931	17332	u		•	ď		
bit 14: electronics/telemetry status (0=off; 1=on)								
bit 13: channel 1 status (0=disable; 1=enable)								
bit 12: channel 2 status (0=disable; 1=enable)								
bit 11: channel 3A status (0=disable; 1=enable)		İ						
bit 10: channel 3B status (0=disable; 1=enable)								
bit 9: channel 4 status (0=disable; 1=enable)								
bit 8: channel 5 status (0=disable; 1=enable)								-
bit 7: channel 3A/3B select status (0=3B; 1=3A) bit 6: voltage calibration status (0=off; 1=on)								
bit 5: cooler heat status (0=off; 1=on)								1.
bit 4: scan motor mode status (0=low; 1=high)								·
bit 3: telemetry lock status (0=not locked on; 1=locked on)								
bit 2: earth shield status (0=disable; 1=deploy)								
bit 1: patch control status (0=off; 1=on)								
bit 0: <zero fill=""></zero>	1.4000	14044	<u> </u>					+
<zero fill=""></zero>	14933	14944	i	4	3	0		
ANALOG HOUSEKEEPING TELEMETRY	14045	14040						
Analog Telemetry Update Flags (If bit = 0, associated	14945	14948	u	4	1	0		
telemetry item is up-to-date. If bit = 1, associated telemetry			1					
item was not updated during most recent telemetry cycle -								
possibly due to lost frame.)								
bits 31-23: <zero fill=""></zero>								
bit 22: motor current								
bit 21: electronics current			1			ļ		
bit 20: blackbody temperature, channel 5	1							
bit 19: detector #5 bias voltage								
bit 18: blackbody temperature, channel 4 bit 17: blackbody temperature, channel 3B	1			ŀ				
thit 16: A/D converter temperature		İ			.			
t 15: blackbody temperature 4	1							
bit 14: blackbody temperature 3								
bit 13: blackbody temperature 2		1						
bit 12: blackbody temperature 1								
bit 11: motor housing temperature					Ì			
bit 10: baseplate temperature bit 9: electronics temperature								
bit 8: cooler housing temperature				1				
bit 7: radiator temperature								
bit 6: patch temperature	1			ļ				
bit 5: earth shield position		ļ	ŀ	l				i
bit 4: patch temperature extended					1			
bit 3: detector #4 bias voltage	+							
bit 2: reference voltage				İ				
bit 1: patch power bit 0: <zero fill=""></zero>								
Patch Temperature (range: 0 - 255)	14949	14949	u	1	1	0	counts	
Patch Temperature Extended (range: 0 - 255)		14950			1		counts	
Patch Power (range: 0 - 255)		14951		<u> </u>	1		counts	
Radiator Temperature (range: 0 - 255)		14952		- 1	1		counts	+
Black Body Temperature 1 (range: 0 - 255)		14953		-	1		counts	+
Black Body Temperature 2 (range: 0 - 255)		14954		1			counts	
Black Body Temperature 3 (range: 0 - 255)		14955		1			counts	
Black Body Temperature 3 (range: 0 - 255)		14956		1	1		counts	 -
		14957		 	1		counts	
Electronics Current (range: 0 - 255) Motor Current (range: 0 - 255)		14958		 	1		counts	
Earth Shield Position (range: 0 - 255)		14959		 			counts	
		14950		- :	1		counts	+
Electronics Temperature (range: 0 - 255) Sooler Housing Temperature (range: 0 - 255)		14960					counts	
		14962					counts	
Motor Housing Temperature (range: 0 - 255)		14962					counts	+
Motor Housing Temperature (range: 0 - 255)	14903	1470	ղ և	·	4	<u> </u>	Louis	

	Start	End	Data	Word	Number	Scale		
Field Name	Octet	Octet	Type	Size	of Words	Factor	Units	Notes
A/D Converter Temperature (range: 0 - 255)	14964	14964	u	1	1	0	counts	
Detector #4 Bias Voltage (range: 0 - 255)	14965	14965	u	1	1	0	counts	
Detector #5 Bias Voltage (range: 0 - 255)	14966	14966	u	1	1	0	counts	
Blackbody Temperature, Channel 3B (range: 0 - 255)	14967	14967	u	1	1	0	counts	
Blackbody Temperature, Channel 4 (range: 0 - 255)	14968	14968	u	1	1	0	counts	
Blackbody Temperature, Channel 5 (range: 0 - 255)	14969	14969	u	1	1	0	counts	
Reference Voltage (range: 0 - 255)	14970	14970	u	1	1	0	counts	
<zero fill=""></zero>	14971	14976	i	2	3	0		
CLOUDS FROM AVHRR (CLAVR)								
<reserved> [CLAVR Status Bit Field]</reserved>	14977	14980	u	4	1	0		
bits 31-1: <undefined></undefined>								ŀ
bit 0: CLAVR status (0=disable, CCM codes zero-filled; 1=enable)				ļ				
<reserved> [CLAVR]</reserved>		14984		4		0		
<reserved> [CLAVR CCM (Clear/Cloudy/Mixed) Codes</reserved>	14985	15496	u	2	256	0		
(0=clear; 1=mixed clear; 2=mixed cloudy; 3=cloudy)]				ŀ				
Word 1								
bits 15-14: CCM code, FOV 1 bits 13-12: CCM code, FOV 2								
Carl code, 104 2								
bits 1-0: CCM code, FOV 8								
								1
Word 2								
bits 15-14: CCM code, FOV 9								
bits 1-0: CCM code, FOV 16		ł						
5.65 1 5. 56.7 55.25 , 1 5.7 <u>1</u> 5		1						
]		
(set of 8 CCM codes per word)]		
								l ,
Word 256		1						- ['
bits 15-14: CCM code, FOV 2041								
bits 1-0: CCM code, FOV 2048		<u> </u>			<u> </u>			
FILLER	15405	1.5055	 	 .		 		
<zero fill=""></zero>	15497	15872	i	4	94	<u> 0</u>		

4.3 AVHRR 1b Data Record Format (Reduced Resolution)

Field Name	Start				Number of Words	Scale Factor	Units	Note
SCAN LINE INFORMATION	Octet	Octet	Type	Size	or words	ractor	Omo	1100
	- 1			2	1	0		
Scan Line Number (cumulative, starting with 1; range: 0-	1	2	u	4	1 1	ľ		ŧ
65,535)	ļ			 _	 	—	··································	
Scan Line Year (four digits, e.g., 2000)	3	4		2	 	0		
Scan Line Day of Year (e.g., 365)	5	6		2	1	0		-
Satellite Clock Drift Delta	7	8		2	1	0	milliseconds	<u> </u>
Scan Line UTC Time of Day	9	12	u	4	1	0	milliseconds	
Scan Line Bit Field	13	14	u	2	1	0		T
bit 15: satellite direction (0=northbound; 1=southbound)								
oit 14: clock drift correction (0=not corrected; 1=scan time corrected		ļ						-
or clock drift)		l	ł					
pits 13-2: <zero fill=""></zero>	i						1	
bits 1-0: channel 3 select (0=3B; 1=3A; 2=transition)		-	 	 				+
<zero fill=""></zero>	15	24	i	2	5	0		+
QUALITY INDICATORS			<u> </u>	<u> </u>		<u> </u>		<u> </u>
Quality Indicator Bit Field (if a bit is on (=1), the statement is	25	28	u	4	∮ 1	0	ł	
true)						1		-
oit 31: do not use scan for product generation				ľ				
oit 30: time sequence error detected within this scan (see below)				1				
oit 29: data gap precedes this scan	:		1					1
oit 28: insufficient data for calibration (see below)			1	ļ			•	ļ
oit 27: earth location data not available (see below)	1			Ì	1			
bit 26: first good time following a clock update (nominally 0)		1		1				
bit 25: instrument status changed with this scan bit 24: bit sync dropped lock during frame (NOAA) or <zero fill=""></zero>				1	ļ			
Metop)	İ		ļ					
bit 23: frame sync word has errors (NOAA) or <zero fill=""> (Metop)</zero>	1				1			1
bit 22: frame sync returned to lock (NOAA) or <zero fill=""> (Metop)</zero>								
bit 21: frame sync word not valid (NOAA) or <zero fill=""> (Metop)</zero>								
bit 20: bit slip occurred during this frame (NOAA) or <zero fill=""> (Metop)</zero>			İ		İ	ŀ		ŀ
bits 19-9: <zero fill=""></zero>			1					1
bit 8: TIP parity error detected (NOAA) or <zero fill=""> (Metop)</zero>					1	1		
bits 7-6: reflected sunlight detected ch 3B (0=no anomaly; 1=anomaly;		ļ						
3=unsure) bits 5-4: reflected sunlight detected ch 4 (0=no anomaly; 1=anomaly;		1	1	1				
ons 5-4: reflected sufflight detected of 4 (0-110 anomaly, 1-anomaly, 3=unsure)					1	ŀ		- [
bits 3-2: reflected sunlight detected ch 5 (0=no anomaly; 1=anomaly;		ļ	1					
3=unsure)		1				1		1
bit 1: resync occurred on this frame (NOAA) or <zero fill=""> (Metop)</zero>								
bit 0: pseudonoise occurred on this frame (NOAA) or <zero fill=""></zero>		l						
(Metop)	ļ.,,	ļ			ļ	ļ		
Scan Line Quality Flags [<reserved>] (zero fill)</reserved>	29				1 1	(<u> </u>	_
Scan Line Quality Flags [Time Problem Code] (If a bit is on	30	30	u		1 1	l ()	
(=1), the statement is true. All bits off implies the scan time is	1	1	1	1				-
as expected.)								
bit 7: time field is bad but can probably be inferred from the previous								
good time								
bit 6: time field is bad and can't be inferred from the previous good	1		1	1		1		
time								
bit 5: this record starts a sequence that is inconsistent with previous				1				
times (i.e., there is a time discontinuity). This may be associated with a	3	1						
spacecraft clock update. (See bit 26, Quality Indicator Bit Field.)			1					
bit 4: start of a sequence that apparently repeats scan times that have								
been previously accepted bits 3-0: <zero fill=""></zero>	I	1	1					-

	Start	End	Data	Word	Number	Scale	<u></u>		ĺ
Field Name					of Words		Units	Notes	ĺ
Scan Line Quality Flags [Calibration Problem Code] (If a bit is	31			1	1	0			
on (=1), the statement is true. These bits complement the								1	
channel indicators; all bits set to 0 indicates normal									
calibration.)									l
bit 7: Scan line not calibrated: all IR channels failed calibration. bit 6: Scan line marginally calibrated: one or more IR channels									l
marginally calibrated OR one or more, but not all, IR channels failed						1			l
calibration.									
bit 5: Scan line not calibrated: bad or insufficient PRT data.								1 1	l
bit 4: Scan line marginally calibrated: marginal PRT data. bit 3: Some uncalibrated channels for this scan line (i.e., one or more,								1	l
but not all, IR channels failed calibration).									l
bit 2: No visible calibration due to either the presence of MIRP					1				l
pseudonoise in place of AVHRR data (NOAA only) or calibration processing turned off.					1	!			l
bit 1: <zero fill=""></zero>					:				l
bit 0: scan line was not calibrated because of satellite maneuver					İ				
(Metop) or <zero fill=""> (NOAA)</zero>									l
Scan Line Quality Flags [Earth Location Problem Code] (If a	32	32	u	1	1	l o			l
bit is on (=1), the statement is true. All bits set to 0 implies the							•		l
earth location was normal.) bit 7: not earth located because of bad time; earth location fields zero-					<u> </u>				l
filled						ŀ			l
bit 6: earth location questionable: questionable time code (see time									l
problem flags above)									İ
bit 5: earth location questionable: marginal agreement with reasonableness check									l
bit 4: earth location questionable: fails reasonableness check									
bits 3-2: <zero fill=""></zero>									
bit 1: not earth located because of satellite in-plane maneuver (Metop) or <zero fill=""> (NOAA)</zero>									
bit 0: not earth located because of satellite out-of-plane maneuver						İ		(
(Metop) or <zero fill=""> (NOAA)</zero>									
Calibration Quality Flags (all bits off implies a good	33	38	u	2	3	0			
calibration)					1				
Word 1: Channel 3B bits 15-8: <zero fill=""></zero>					ļ				l
bit 7: this channel is not calibrated									l
bit 6: this channel is calibrated but questionable									
bit 5: all bad blackbody counts for scan line									l
bit 4: all bad space view counts for scan line bit 3: <zero fill=""></zero>									l
bit 2: marginal blackbody view counts for this line								1	l
bit 1: marginal space view counts for this line									l
bit 0: <zero fill=""></zero>								1	1
Words 2-3: Channels 4-5 (in order)									l
Count of Bit Errors in Frame Sync (NOAA) or <zero fill=""></zero>	39	40	u	2	1	0			l
(Metop)									l
<zero fill=""></zero>	41	48	i	4	2	0			l
CALIBRATION COEFFICIENTS									l
Visible Operational Cal Ch 1 Slope 1	49			4	1	7			l
Visible Operational Cal Ch 1 Intercept 1	53			4	1	6			
Visible Operational Cal Ch 1 Slope 2	57			4	1	7			l
Visible Operational Cal Ch 1 Intercept 2	61	64		4	1	6			l
Visible Operational Cal Ch 1 Intersection	65			4	1	0		$oxed{oxed}$	l
Visible Test Cal Ch 1 Slope 1	69			4	1	7			l
Visible Test Cal Ch 1 Intercept 1	73			4	1	6			l
Visible Test Cal Ch 1 Slope 2	77			4	11	7		<u> </u>	
Visible Test Cal Ch 1 Intercept 2	81	84		4	11	6			
Visible Test Cal Ch 1 Intersection	85			4	1	9		↓ Ĭ	
Visible Prelaunch Cal Ch 1 Slope 1	89	92	i	4	1 1	<u> </u>			i

	Start	End	Data	Word	Number	Scale		T
Field Name	Octet	Octet	Type	Size	of Words	Factor	Units	Notes
Visible Prelaunch Cal Ch 1 Intercept 1	93	96	i	4	1	6		
isible Prelaunch Cal Ch 1 Slope 2	97	100	i	4	1	7		
Visible Prelaunch Cal Ch 1 Intercept 2	101	104	i	4	1	6		
Visible Prelaunch Cal Ch 1 Intersection	105	108	i	4	1	O		
Visible Operational Cal Ch 2 Slope 1	109	112	i	4	1	7		
Visible Operational Cal Ch 2 Intercept 1	113	116	i	4	1	6		
Visible Operational Cal Ch 2 Slope 2	117	120	i	4	1	7		
Visible Operational Cal Ch 2 Intercept 2	121	124		4	1	6		
Visible Operational Cal Ch 2 Intersection	125			4	1	0		
Visible Test Cal Ch 2 Slope 1	129			4	1	7		
Visible Test Cal Ch 2 Intercept 1	133			4	1	6		
Visible Test Cal Ch 2 Slope 2	137	140		4		7		
Visible Test Cal Ch 2 Intercept 2	141	144		4		6		
Visible Test Cal Ch 2 Intersection	145			4		o		
Visible Prelaunch Cal Ch 2 Slope 1	149			4		7		\dagger
Visible Prelaunch Cal Ch 2 Intercept 1	153			4		6		
Visible Prelaunch Cal Ch 2 Slope 2	157	160		4		7		+
Visible Prelaunch Cal Ch 2 Intercept 2	161	164		4		6		+
Visible Prelaunch Cal Ch 2 Intercept 2 Visible Prelaunch Cal Ch 2 Intersection	165			4		0		+
Visible Operational Cal Ch 3A Slope 1	169			4		 		+
Visible Operational Cal Ch 3A Stope 1 Visible Operational Cal Ch 3A Intercept 1	173	176		4		6		+
	177	180		4		1 7		+
Visible Operational Cal Ch 3A Slope 2	181	184		4	· · · · · · ·	6		+
Visible Operational Cal Ch 3A Intercept 2	185			4		0		
Visible Operational Cal Ch 3A Intersection				 	-	7		
Visible Test Cal Ch 3A Slope 1	189			4				_
Visible Test Cal Ch 3A Intercept 1	193			4		7		
isible Test Cal Ch 3A Slope 2	197			4	 			
Visible Test Cal Ch 3A Intercept 2	201	204		4		6		
Visible Test Cal Ch 3A Intersection	205			4		0		
Visible Prelaunch Cal Ch 3A Slope 1	209			4		7		
Visible Prelaunch Cal Ch 3A Intercept 1	213			4		6		-
Visible Prelaunch Cal Ch 3A Slope 2	217			4		7		-
Visible Prelaunch Cal Ch 3A Intercept 2	221	224		4]	6		
Visible Prelaunch Cal Ch 3A Intersection	225					0		
IR Operational Cal Ch 3B Coefficient 1	229			4	+	6		<u> </u>
IR Operational Cal Ch 3B Coefficient 2	233			4				
IR Operational Cal Ch 3B Coefficient 3	237			4		6		
IR Test Cal Ch 3B Coefficient 1	241		i	4		l <u>6</u>		
IR Test Cal Ch 3B Coefficient 2	245			4	1	l <u>6</u>		
IR Test Cal Ch 3B Coefficient 3	249			4	1	l <u>6</u>		
IR Operational Cal Ch 4 Coefficient 1	253	256		4	1 1	1 6		
IR Operational Cal Ch 4 Coefficient 2	257	260	i	4	1 1	6		
IR Operational Cal Ch 4 Coefficient 3	261	264	i	4	1	1 7		
IR Test Cal Ch 4 Coefficient 1	265	268	i		1 1	1 6	i	
IR Test Cal Ch 4 Coefficient 2	269	272	i	4	1 1	1 6	i	
IR Test Cal Ch 4 Coefficient 3	273	276	i	-	1 :	1 7	1	
IR Operational Cal Ch 5 Coefficient 1	277			4	4	1 6	j	1
IR Operational Cal Ch 5 Coefficient 2	281			4	1	1 6		1
IR Operational Cal Ch 5 Coefficient 3	285	+		1	1	1 7	7	1
IR Test Cal Ch 5 Coefficient 1	289				4	1 6	i	1
IR Test Cal Ch 5 Coefficient 2	293		i	+	4	1 6	i	1
R Test Cal Ch 5 Coefficient 3	297	+			4	1 7	1	

					Number			Ţ <u>.</u>	
Field Name	Octet	Octet	Type	Size	of Words	Factor	Units	Notes	١.
NAVIGATION								 	
Computed Yaw Steering (Metop: content defined below) or <zero fill=""> (NOAA) Word 1: Computed roll angle</zero>	301	306	i	2	3	0	degrees		
Word 2: Computed pitch angle Word 3: Computed yaw angle									
Total Applied Attitude Correction	307	312	i		3	-3	degrees	 	l
Word 1: Roll	50,	3.2	•	_]		degrees		
Word 2: Pitch									
Word 3: Yaw	212	216			ļ			 - -	ļ
Navigation Status Bit Field (bits 20-18 are Metop specific and	313	316	u	4	1 1	0	1		1
will contain zero fill for NOAA; bits 17-0 are NOAA specific and will contain zero fill for Metop)									
bits 31-21: <zero fill=""></zero>									
bit 20-19: yaw steering parameters usage indicator (0=no yaw steering correction; 1=computed parameters from Metop data stream; 2=measured parameters from Metop data stream; 3=computed									
parameters from AELDS) bit 18: Metop maneuver indicator (0=scan does not occur during a									
Metop in-plane or out-of-plane maneuver; 1=scan, or some part of it,									
occurs during a maneuver) bit 17: earth location at the satellite subpoint is accurate and									
reasonable, i.e., is within tolerance defined by "Nadir Earth Location									
Tolerance" in header (0=out of tolerance; 1=in tolerance)									
bit 16: earth location corrected for Euler angles (0=FALSE; 1=TRUE) bits 15-12: earth location indicator (0=earth location available; 1=user									
ephemeris files greater than 24 hours old; 2=no earth location available)									
bits 11-8: spacecraft attitude control (0=operating in YGC or NOMINAL									1
mode; 1=operating in another mode; 2=attitude exceeds nominal tolerance; 3=both 1 and 2)									
bits 7-4: attitude SMODE (0=nominal mode; 1=rate nulling mode;								(
2=YGC mode; 3=search mode; 4=coast mode)									
bits 3-0: attitude PWTIP\$AC (0=nominal mode/no test; 1=yaw axis test in progress; 2=roll axis test in progress; 3=pitch axis test in progress)	İ								
Time Associated with Euler Angles	317	320	i	4	1	0	seconds		1
Euler Angles (NOTE: For Metop-originated AVHRR data, this	321	326	i	2	3	3	degrees		1
field is also referred to as the measured yaw steering									
parameters.) Word 1: Roll									
Word 2: Pitch					1				l
Word 3: Yaw									
Spacecraft Altitude above Reference Ellipsoid	327	328		2			kilometers]
Angular Relationships (relative azimuth range +/- 180.00	329	634	i	2	153	2	degrees	1	
degrees) Word 1: Solar zenith angle, FOV 5									
Word 2: Satellite zenith angle, FOV 5									
Word 3: Relative azimuth angle, FOV 5		•							l
Word 4: Solar zenith angle, FOV 13									l
(set of 3 angles every 8 FOVs)									
Word 153: Relative azimuth angle, FOV 405				ļ		ļ			4
<zero fill=""> Forth Location (worth latitude and and launitude and annihilation)</zero>	635			2		0	1		1
Earth Location (north latitude and east longitude are positive) Word 1: Latitude, FOV 5 Word 2: Longitude, FOV 5 Word 3: Latitude, FOV 13	641	1048	i	4	102	4	degrees		
(lat/lon word pair every 8 FOVs)									
Word 102: Longitude, FOV 405									
<zero fill=""></zero>	1049	1056	i	4	2	- 0	 	 `	Γ
							·		_

				1	Number		Units	Natar
Field Name	Octet	Octet	1 ype	Size	of Words	ractor	Units	Notes
FRAME TELEMETRY	1057	1068		2	-			
Frame Sync (The first 60 bits (in 6 10-bit values) from a 63-bit	103/	1008	u		١	۱ ٩		1
pseudonoise generator starting in the all I's state. The								
generator polynomial is: $x^6 + x^5 + x^2 + 1$.) (NOAA:			,					
content defined below) or								
<zero fill=""> (Metop)</zero>								
Word 1: 644 Word 2: 367								
Word 3: 860								İ
Word 4: 413			ŀ					
Word 5: 527				1				
Word 6: 149								
ID (NOAA: content defined below) or	1069	1072	u	2	2	0		
<zero fill=""> (Metop)</zero>			1	ļ				
Word 1			ļ.					
bits 15-10: <zero fill=""></zero>		ŀ		i				
bit 9: MIRP/AVHRR sync (0=Internal sync; 1=AVHRR sync)	ł	ĺ						
bits 8-7: frame ID (0=GAC frame; 1=HRPT minor frame 1; 2=HRPT					Ì			
minor frame 2; 3=HRPT minor frame 3)	1							
bits 6-3: spacecraft address bit 2: resync (0=frame stable; 1=frame resync occurred)				i				
bit 1: AVHRR input (0=pseudonoise; 1=normal)						ļ.		
bit 0: channel 3 status (0=AVHRR channel 3B; 1=AVHRR channel 3A)			ł					i
•	1	1				1		
Word 2			ĺ					
bits 15-10: <zero fili=""></zero>	1					·		
bits 9-0: <undefined></undefined>	1072	1000	 	 	<u> </u>	0		
Time Code (NOAA: content defined below) or	1073	1080	u	1 4	4	1 '		
<zero fill=""> (Metop)</zero>								
Word 1								
nits 15-10: <zero fill=""> pits 9-1: binary day count</zero>								İ
bit 0: 0 (zero)				1				
Word 2			1					
bits 15-10: <zero fill=""></zero>				i	1			
bit 9: 1 (one)				1				
bit 8: 0 (zero) bit 7: 1 (one)								
bits 6-0: most significant part of binary millisecond of day count]				1		
Dits 0-0. Host significant part of binary miniscount of day seems		1		1				1
Word 3			l					
bits 15-10: <zero fill=""></zero>						Ì		
bits 9-0: part of binary millisecond of day count			1			ļ		
l								
Word 4 bits 15-10: <zero fill=""></zero>								
bits 9-0: least significant part of binary millisecond of day count	1			1				ļ
Ramp Calibration	1081	1090	u	1 :	2 :	5 0	counts	
Word 1: Ramp calibration, channel 1	-557		"	1 ']			1
Word 2: Ramp calibration, channel 2	i	1						
Word 3: Ramp calibration, channel 3	1		1		1	1	1	
Word 4: Ramp calibration, channel 4	1		1	1			1	1
Word 5: Ramp calibration, channel 5	1	1		 	<u> </u>	 	\	
Internal Target Temperature (Three readings from one of the	1091	1096	5 u	1 3	2 3	3 0	counts	1
four platinum resistance thermometers (PRT). A different PRT	1		1	1			1	
is sampled for each scan. Every fifth scan will contain a			1	1		1		
reference value of 0 in place of each reading.)	1		1	1			[
Word 1: PRT reading 1			1	1		İ		
Word 2: PRT reading 2			1					
Word 3: PRT reading 3	1000		 	 -			\	
atch Temperature	109				2	<u> </u>	counts	1
Undefined> (NOAA) or	1099	1100	0 և	1 3	2	դ (1	
<zero fill=""> (Metop)</zero>	<u></u>		<u> </u>			<u> </u>	<u> </u>	<u></u>
		_						

	Start	End	Data	Word	Number	Scale		
Field Name					of Words		Units	Notes
Back Scan (Ten samples of calibration target view data from each of AVHRR channels 3, 4, and 5.) Word 1: channel 3, sample 1	1101	1160	u	2	30	0	counts	1
Word 2: channel 4, sample 1		i						
Word 3: channel 5, sample 1 Word 4: channel 3, sample 2					,			
Word 30: channel 5, sample 10								
Space Data (Ten samples of space view data from each of	1161	1260	u	2	50	0	counts	
AVHRR channels 1, 2, 3, 4, and 5.)								
Word 1: channel 1, sample 1 Word 2: channel 2, sample 1								
Word 5: channel 5, sample 1 Word 6: channel 1, sample 2		i						
Word 50: channel 5, sample 10								
Sync Delta (NOAA: content defined below) or	1261	1262	u	2	1	0		
<zero fill=""> (Metop) bits 15-10: <zero fill=""></zero></zero>								
bit 9: AVHRR sync (0=early; 1=late)								
bits 8-0: 9-bit binary count of 0.9984 MHz periods	<u> </u>							
<zero fill=""></zero>	1263	1264	i	2	1	0		<u> </u>
EARTH OBSERVATIONS	1065	2000			(00			-
Earth Data Word 1	1265	3992	u	4	682	0	counts	
bits 31-30: <zero fill=""></zero>								
bits 29-20: channel 1, FOV 1								
bits 19-10: channel 2, FOV 1								
bits 9-0: channel 3, FOV 1								
Word 2		,						
bits 31-30: <zero fill=""> bits 29-20: channel 4, FOV 1</zero>								
bits 19-10: channel 5, FOV 1								
bits 9-0: channel 1, FOV 2								
 Word 682								
bits 31-30: <zero fill=""></zero>								
bits 29-20: channel 4, FOV 409								
bits 19-10: channel 5, FOV 409 bits 9-0: <zero fill=""></zero>								
<zero fill=""></zero>	3993	4000	i	4	2	0		
DIGITAL B HOUSEKEEPING TELEMETRY								
Digital B Telemetry Update Flags (If bit = 0, associated	4001	4002	u	2	1	0		
telemetry item is up-to-date. If bit = 1, associated telemetry								į
item was not updated during most recent telemetry cycle-	1							İ
possibly due to lost frame.) bit 15: scan motor/telemetry status	1							
bit 14: electronics/telemetry status					:			
bit 13: channel 1 status								ł
bit 12: channel 2 status bit 11: channel 3A status								
bit 10: channel 3B status								
bit 9: channel 4 status								
bit 8: channel 5 status bit 7: channel 3A/3B select status								
bit 6: voltage calibration status								
bit 5: cooler heat status								
bit 4: scan motor mode status bit 3: telemetry lock status								
bit 2: earth shield status		}						(
bit 1: patch control status								
bit 0: <zero fill=""></zero>	l	L	L					1

Start End Data Words Start End Data Words Ractor Units Notes		1044	T71	D-4-	11 7	Normal and	Casla		Т
AVERITY Digital Data 1.5 can most provides 1	EV-LI Mana							Linite	Notes
1.15: scan motory/telemetry status (0-off; 1=on) 11.12: channe 1 status (0-offste): 1-enable) 11.12: channe 2 status (0-disable; 1-enable) 11.12: channe 2 status (0-disable; 1-enable) 11.12: channe 3 status (0-disable; 1-enable) 11.13: channe 3 status (0-disable; 1-enable) 11.13: channe 3 status (0-disable; 1-enable) 11.13: channe 3 status (0-disable; 1-enable) 11.13: channe 3 status (0-disable; 1-enable) 11.13: channe 3 status (0-disable; 1-enable) 11.13: channe 3 status (0-disable; 1-enable) 11.14: channe 3 status (0-disable; 1-enable) 11.15: channe 4 status (0-disable; 1-enable) 11.15: channe 3 status (0-disable; 1-enable) 11.15: channe 4 status (0-disable; 1-enable) 11.15: channe 4 status (0-disable; 1-enable) 11.15: channe 4 status (0-disable; 1-enable) 11.15: channe 4 status (0-disable; 1-enable) 11.15: channe 4 status (0-disable; 1-enable) 11.15: channe 4 status (0-disable; 1-enable) 11.15: channe 4 status (0-disable; 1-enable) 11.15: channe 4 status (0-disable; 1-enable) 11.15: channe 5 status (0-disable; 1-enable) 11.15: channe 5 status (0-disable; 1-enable) 11.15: channe 5 s					Size	OI WORUS	ractor	Units	110162
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lemetry litem is up-to-date. If bit = 1, associated telemetry litem was not updated during most recent telemetry cycle - obssibly due to lost frame.) bit 32: motor current bit 20: blackbody temperature, channel 5 bit 19: detector 45 bias voltage bit 18: blackbody temperature, channel 4 bit 17: blackbody temperature, channel 3B bit 16: A/D converter temperature 4 bit 17: blackbody temperature 4 bit 18: blackbody temperature 2 bit 18: blackbody temperature 2 bit 18: blackbody temperature 2 bit 18: blackbody temperature 2 bit 18: blackbody temperature 2 bit 19: electronics temperature bit 10: baseplate temperature bit 10: baseplate temperature bit 10: baseplate temperature bit 19: electronics temperature bit 6: capit hitely position bit 4: patch temperature bit 5: earth shield position bit 12: reference voltage bit 1: patch power with 10: capit 11: patch power bit 10: capit 11: patch power with 10: capit 11: patch power with 10: capit 11: patch power (range: 0 - 255) bit 10: capit 11: patch power (range: 0 - 255) bit 10: capit 11: patch power (range: 0 - 255) bit 10: capit 11: patch power (range: 0 - 255) bit 10: capit 11: patch power (range: 0 - 255) bit 10: capit 11: patch power (range: 0 - 255) bit 10: capit 11: patch power (range: 0 - 255) bit 10: capit 11: patch power (range: 0 - 255) bit 10: capit 11: patch power (range: 0 - 255) bit 10: capit 11: patch power (range: 0 - 255) bit 10: capit 11: patch power (range: 0 - 255) bit 10: capit 11: patch power (range: 0 - 255) bit 10: capit 11: patch power (range: 0 - 255) bit 11: patch power (range: 0 - 255) bit 11: patch power (range: 0 - 255) bit 11: patch power (range: 0 - 255) bit 11: patch power (range: 0 - 255) bit 11: patch power (range: 0 - 255) bit 11: patch power (range: 0 - 255) bit 11: patch power (range: 0 - 255) bit 11: patch power (range: 0 - 255) bit 11: patch power (range: 0 - 255) bit 11: patch power (range: 0 - 255) bit 11: patch power (range: 0 - 255) bit 11: patch power (range: 0 - 255) bit 11: patch power (range: 0 - 255) bit 11: patch power (4017	4020		 	1			++
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	Start	End	Data	Word	Number	Scale		
Field Name	Octet	Octet	Type	Size	of Words	Factor	Units	Notes
A/D Converter Temperature (range: 0 - 255)	4036	4036	u	1	1	0	counts	
Detector #4 Bias Voltage (range: 0 - 255)	4037	4037	u	1	1	0	counts	
Detector #5 Bias Voltage (range: 0 - 255)	4038	4038	u	1	1	. 0	counts	
Blackbody Temperature, Channel 3B (range: 0 - 255)	4039	4039	u	1	1	. 0	counts	
Blackbody Temperature, Channel 4 (range: 0 - 255)	4040	4040	u	1	1	0	counts	
Blackbody Temperature, Channel 5 (range: 0 - 255)	4041	4041	u	1	1	0	counts	
Reference Voltage (range: 0 - 255)	4042	4042	u	1	1	0	counts	
<zero fill=""></zero>	4043	4048	i	2	3	0		
CLOUDS FROM AVHRR (CLAVR)								
Reserved> [CLAVR Status Bit Field]	4049	4052	u	4	1	0		
bits 31-1: <undefined></undefined>								
bit 0: CLAVR status (0=disable, CCM codes zero-filled; 1=enable)		10.55						
<pre><reserved>[CLAVR]</reserved></pre>	4053			4	1 -	0		
<reserved> [CLAVR CCM (Clear/Cloudy/Mixed) Codes</reserved>	4057	4160	u	2	52	9 0		
(0=clear; 1=mixed clear; 2=mixed cloudy; 3=cloudy)]								
Word 1 bits 15-14: CCM code, FOV 1								
bits 13-14: CCM code, FOV 1							•	
bits 1-0: CCM code, FOV 8								
L								
Word 2 bits 15-14: CCM code, FOV 9		ľ						
Dis 15-14: CCM code, FOV 9								
bits 1-0: CCM code, FOV 16								
,								1 1
(set of 8 CCM codes per word)								
•••]		1 1
Word 52]		
bits 15-14: CCM code, FOV 409			,					
bits 13-0: <zero fill=""></zero>								
FILLER								
<zero fill=""></zero>	4161	4608	i	4	112	Ö		

5 TBCs/TBDs

TBC1: The valid values of the "Component ID" field in the header record.

TBC2: The values of the "Spacecraft Identification Code" field in the header record for the Metop satellites, and their origin.

TBD1: The content and format of the secondary header record.

TBD2: The unit of measure, scale factor, and content of the "Change in Spacecraft Velocity" field in the header record.

TBD3: The unit of measure and scale factor of the "Spacecraft Mass" field in the header record.

6 Notes

1. In the Level 0 GDS from Metop, there will be 5 words of Internal Target Temperature readings (not 3), 5 words of Patch Temperature readings (not 1), and 50 words of Back Scan readings (not 30). It is assumed this extra data is meaningless. Therefore, onboard the NOAA satellites it is being ignored by the MIRP. It is also assumed that during ingest of the Metop GDS, this extra data will be ignored as well.

7 Acronyms

A/D	Analog-to-Digital
AELDS	Advanced Earth Location System
AMSU	Advanced Microwave Sounding Unit
ASCII	American Standard Code for Information Interchange
AU	Astronomical Unit
AVHRR	Advanced Very High Resolution Radiometer
CLAVR	Clouds From AVHRR
cm	centimeter
CPIDS	Calibration Parameters Input Data Set
D/A	Digital-to-Analog
FOV	Field Of View
FRAC	Full Resolution Area Coverage
GAC	Global Area Coverage
GDS	Global Data Set
HRPT	High Resolution Picture Transmission
IJPS	Initial Joint Polar-orbiting Operational Satellite System
IR	Infrared
km	kilometer
LAC	Local Area Coverage
Metop	Meteorological Operational Satellite
MHz	Megahertz
NOAA	National Oceanic and Atmospheric Administration
PACS	Polar Acquisition and Control Subsystem
PRT	Platinum Resistance Thermometer
SAIP	Stored AIP
SOCC	Satellite Operations Control Center
STIP	Stored TIP
TBC	To Be Confirmed
TBD	To Be Determined
TIP	TIROS Information Processor
UTC	Universal Time Coordinated
YGC	Yaw Gyrocompassing